National Institute of Standards and Technology
Flat Panel Display Laboratory
Version 1.0, April 16, 2001

TEST PATTERNS

NISTSU01.*

These patterns are provided for the setting up and examining an electronic display. If the display has adjustments and the manufacturer doesn't specify how to set the display up, adjust the display settings (contrast, brightness, etc.) to obtain the most acceptable performance according to how the display is intended to be used. The settings established with this method should not be changed during the course of other measurements serving to characterize the display, unless the display is used in a manner that optimizes the display performance for each measurement performed.

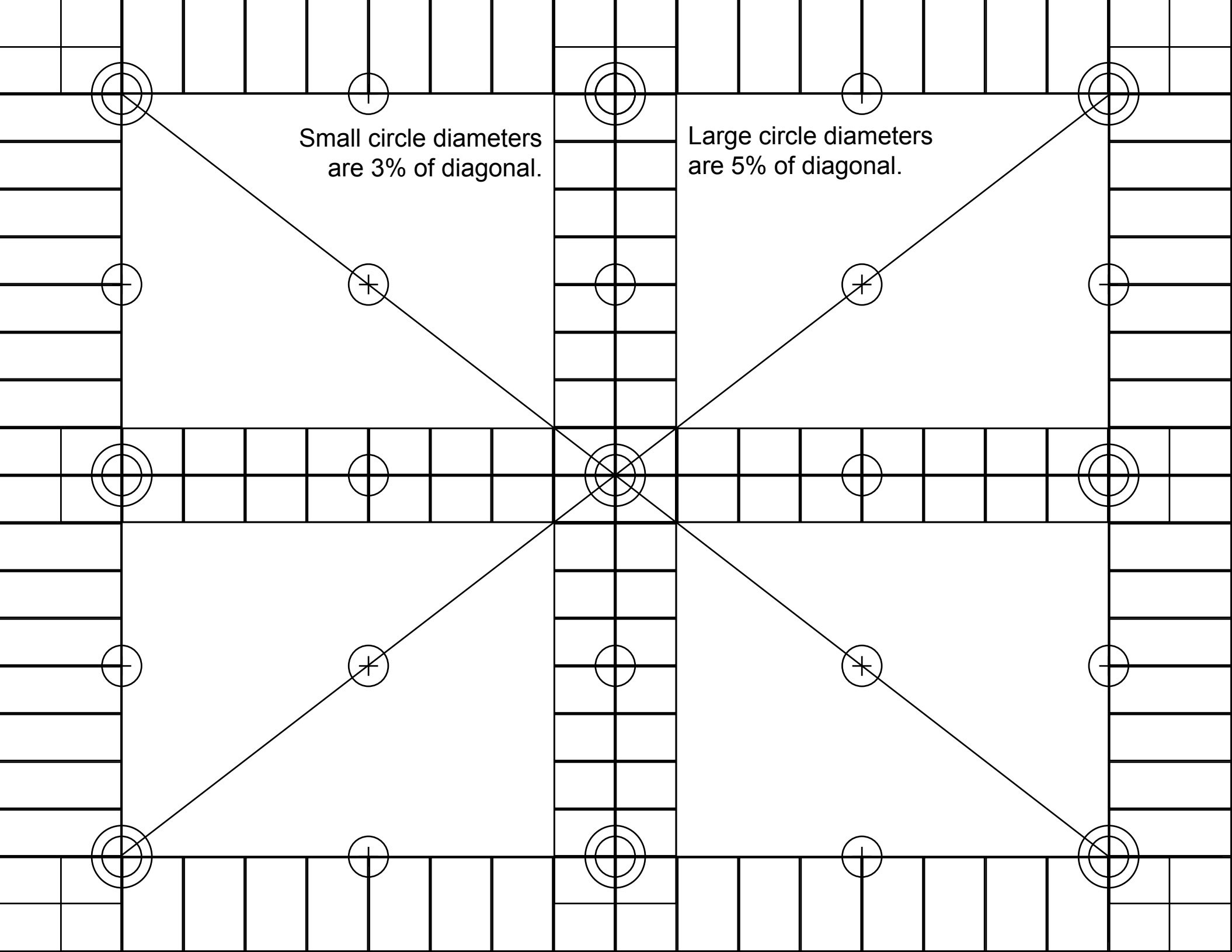
For more information contact Edward F. Kelley, 301-975-3842, kelley@nist.gov.

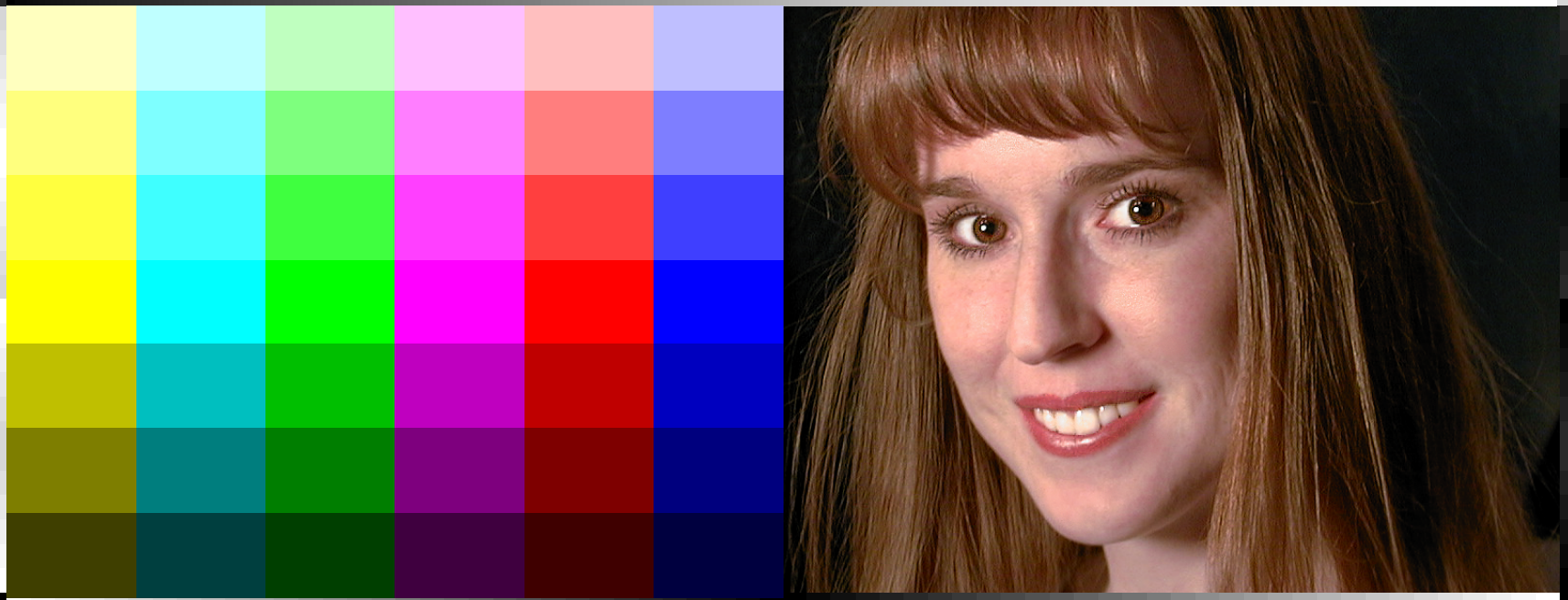
RENDERING GRAY LEVELS AT A LOWER GRAY-SCALE RESOLUTION:

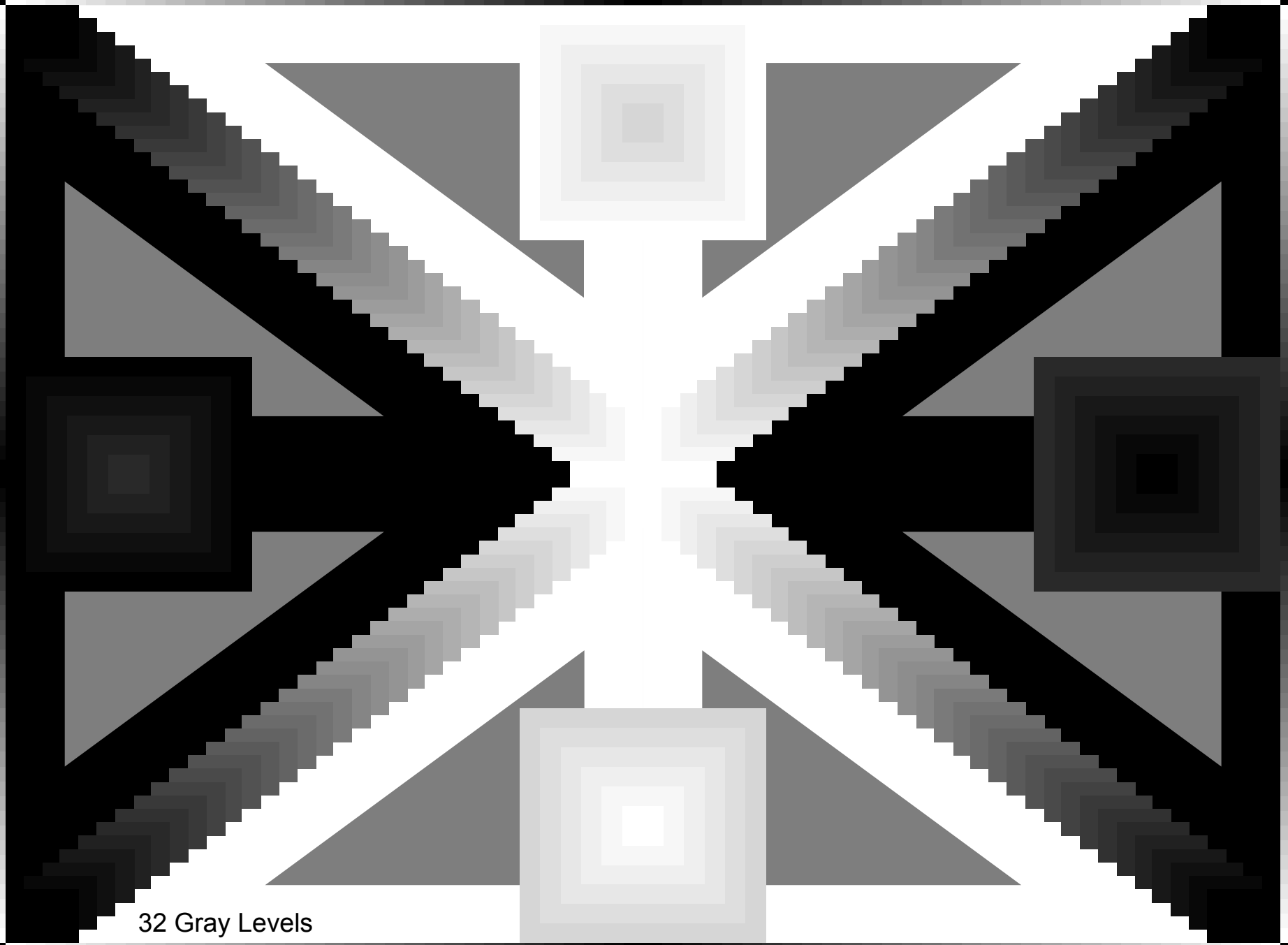
Bits in software are associated with discrete levels of electrical signals to produce various shades of gray on the screen. These bit levels are called gray levels or command levels. The relationship between the gray level (bits in software) and the gray shade is the gray scale or the electro-optical transfer function—sometimes called the "gamma" because of the historical usage of the term. The number of gray shades actually produced will not necessarily be the same as the number of gray levels depending upon the characteristics of the display used. Given n gray levels that can be employed to present gray shades on a screen, there are $w = n - 1$ gray levels above zero with gray-level 0 for black and gray-level $w = n - 1$ for white. We want to select a subset of m levels ($m < n$) that are relatively evenly spaced within this larger set of n levels. The interval between the w levels to create m levels is $\Delta V = w/(m-1)$, which may not be an integer. The m levels we select are the (integer) values given by $Vi = \text{int}[(i-1)\Delta V]$ for $i = 1, 2, ..., m$; or $Vi = 0, \text{int}(\Delta V), \text{int}(2\Delta V), \text{int}(3\Delta V), ..., \text{int}[(m-1)\Delta V]$, with $\text{int}[(m-1)\Delta V] = w$ for white. For example, in an 8-bit gray scale, there are $n = 256 = 28$ levels with the white level as $w = 255$. Suppose we want to select $m = 8$ gray levels that are evenly spaced. The needed interval is $\Delta V = 36.4286$, and the chosen levels are: 0, 36, 73, 109, 146, 182, 219, 255. If we wanted to select $m = 32$ levels from the 256 levels, we'd use $\Delta V = 8.2258$ to give levels: 0, 8, 16, 25, 33, 41, 49, 58, 66, 74, 82, 90, 99, 107, 115, 123, 132, 140, 148, 156, 165, 173, 181, 189, 197, 206, 214, 222, 230, 239, 247, 255.

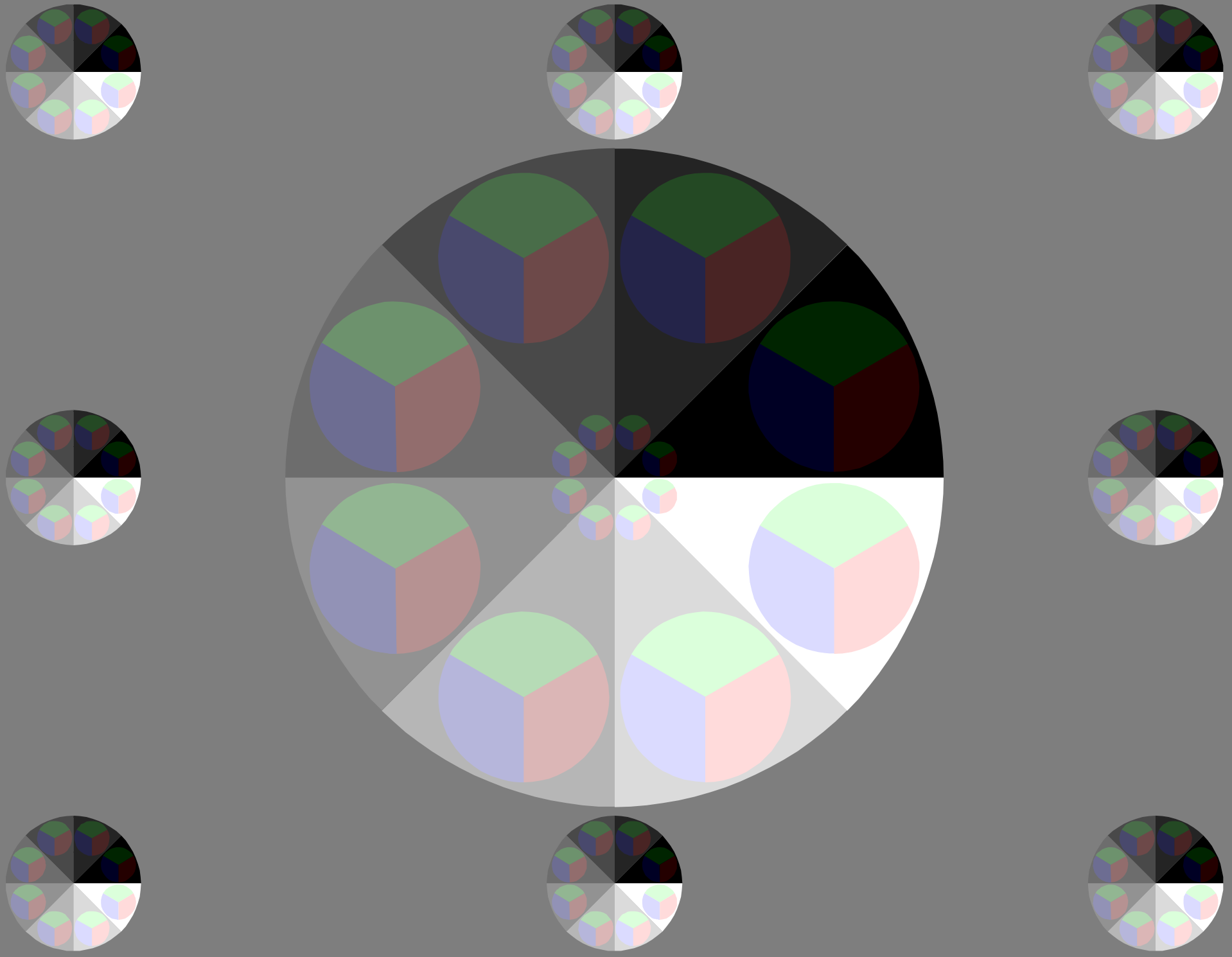
DISCLAIMER

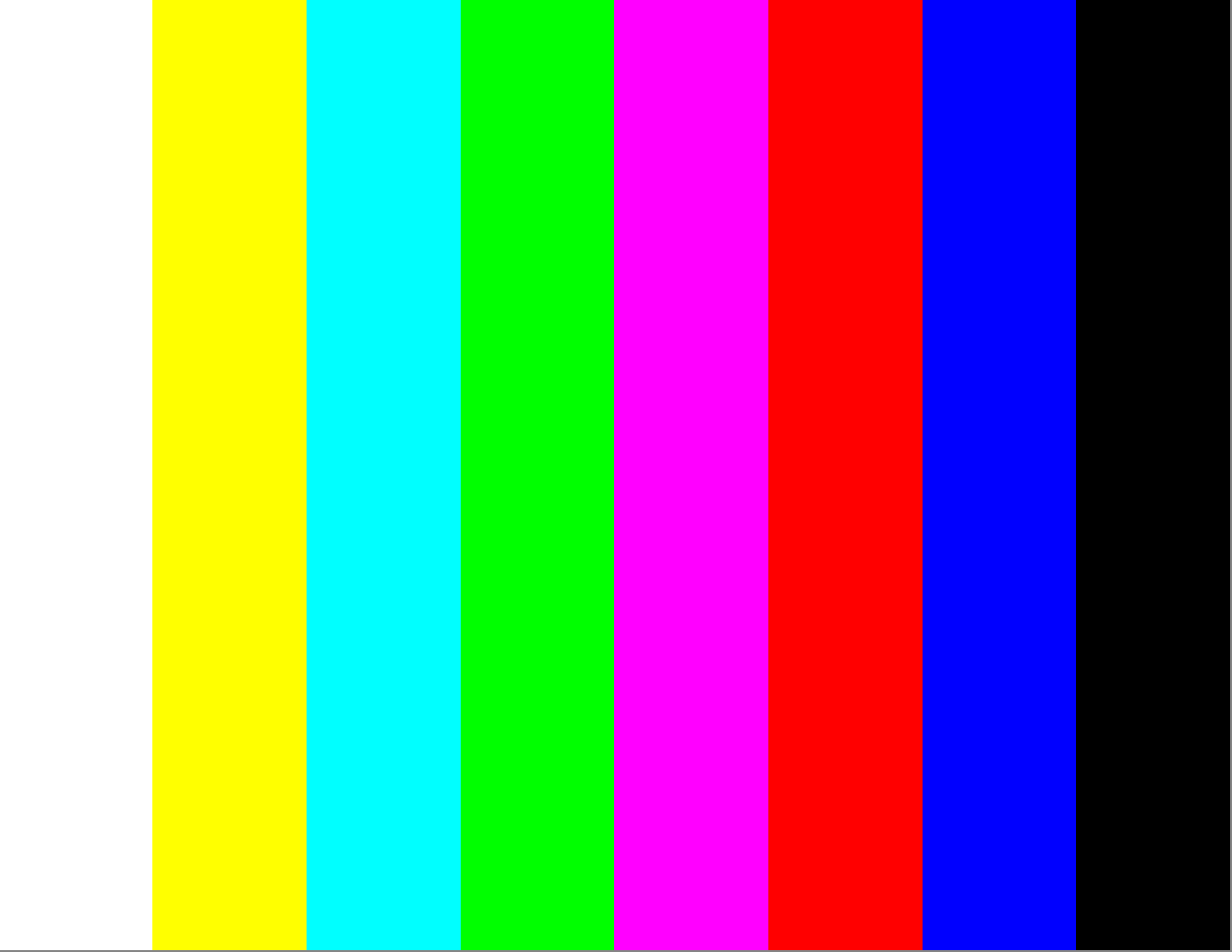
These patterns and test images are prototypes for our electronic-display standards development activities in standards committees and working groups. They are not to be distributed as approved NIST test patterns nor are they standard reference material. They are supplied without any guarantee of their accuracy, suitability, or completeness. It is anticipated that modifications will be made to this set in the future. These are supplied for your scientific experimentation only. We would value any suggestions or comments. The use of any commercial products in connection with the development of these test patterns does not constitute an endorsement by NIST.

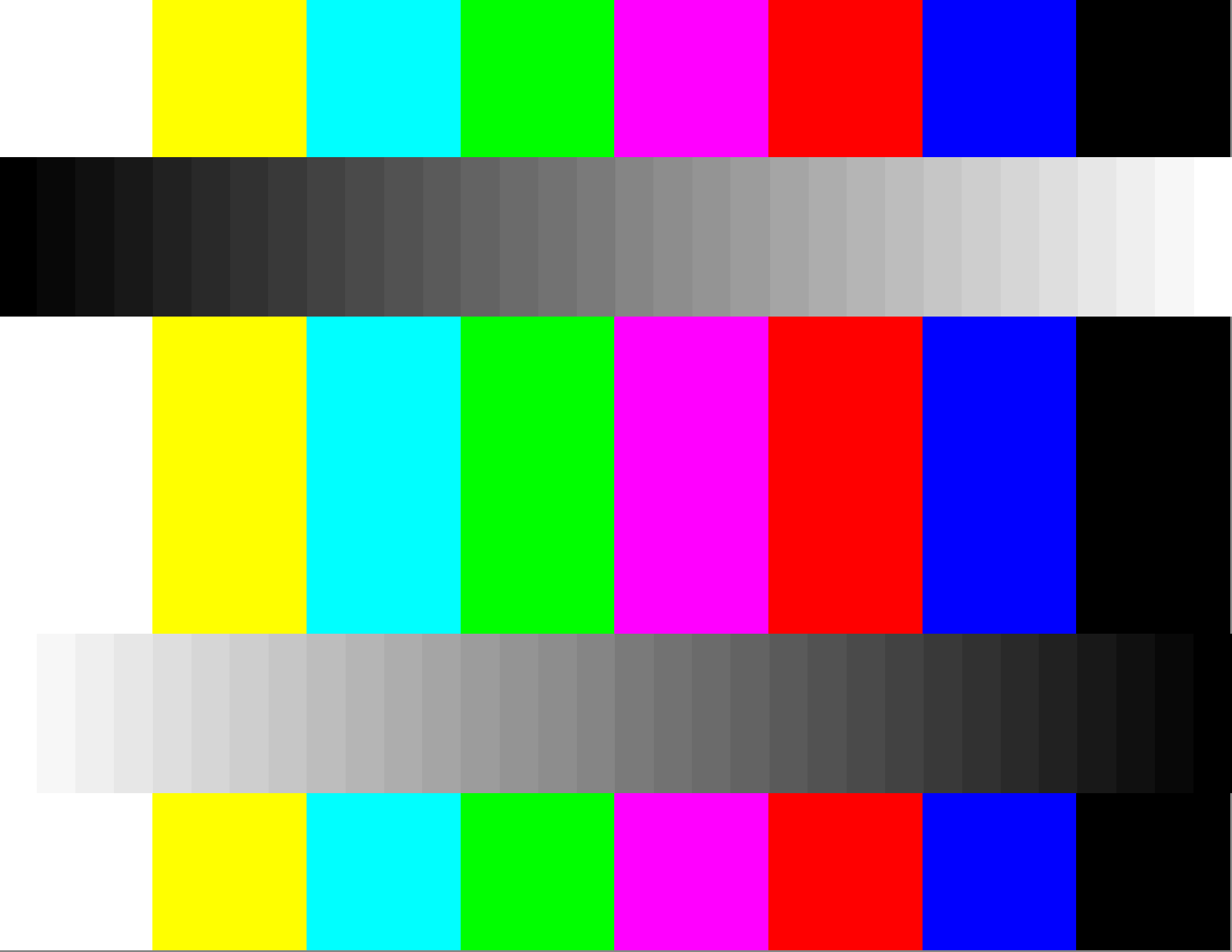

Small circle diameters
are 3% of diagonal.
Large circle diameters
are 5% of diagonal.

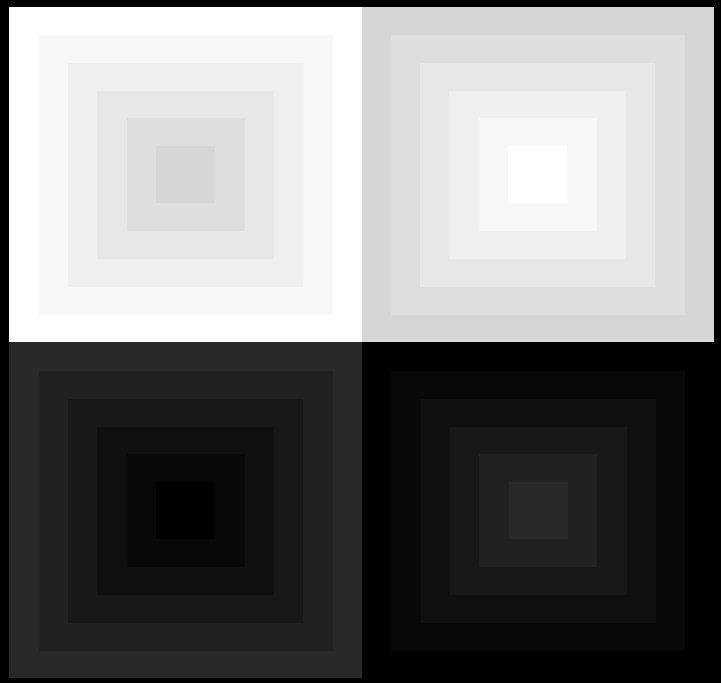


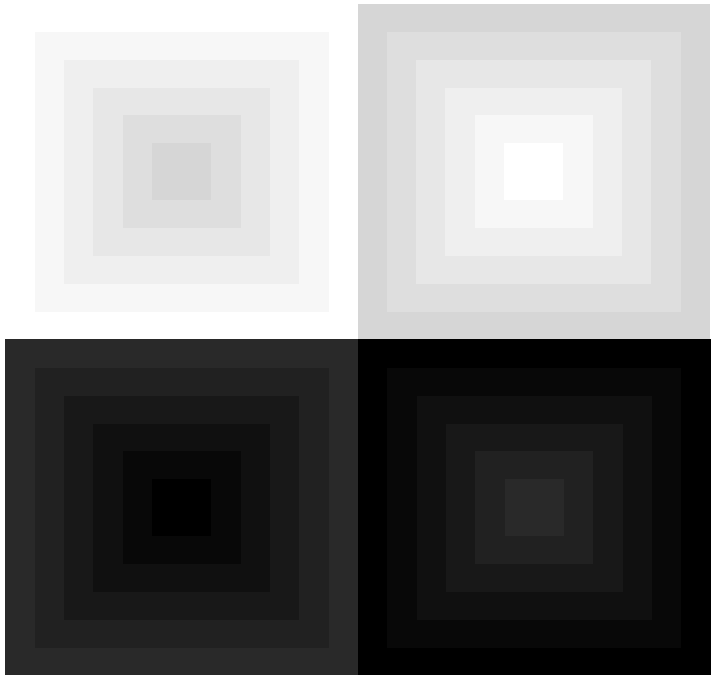

32 Gray Levels











TEXT SAMPLES

The quick brown fox jumps over the lazy dog. 0123456789

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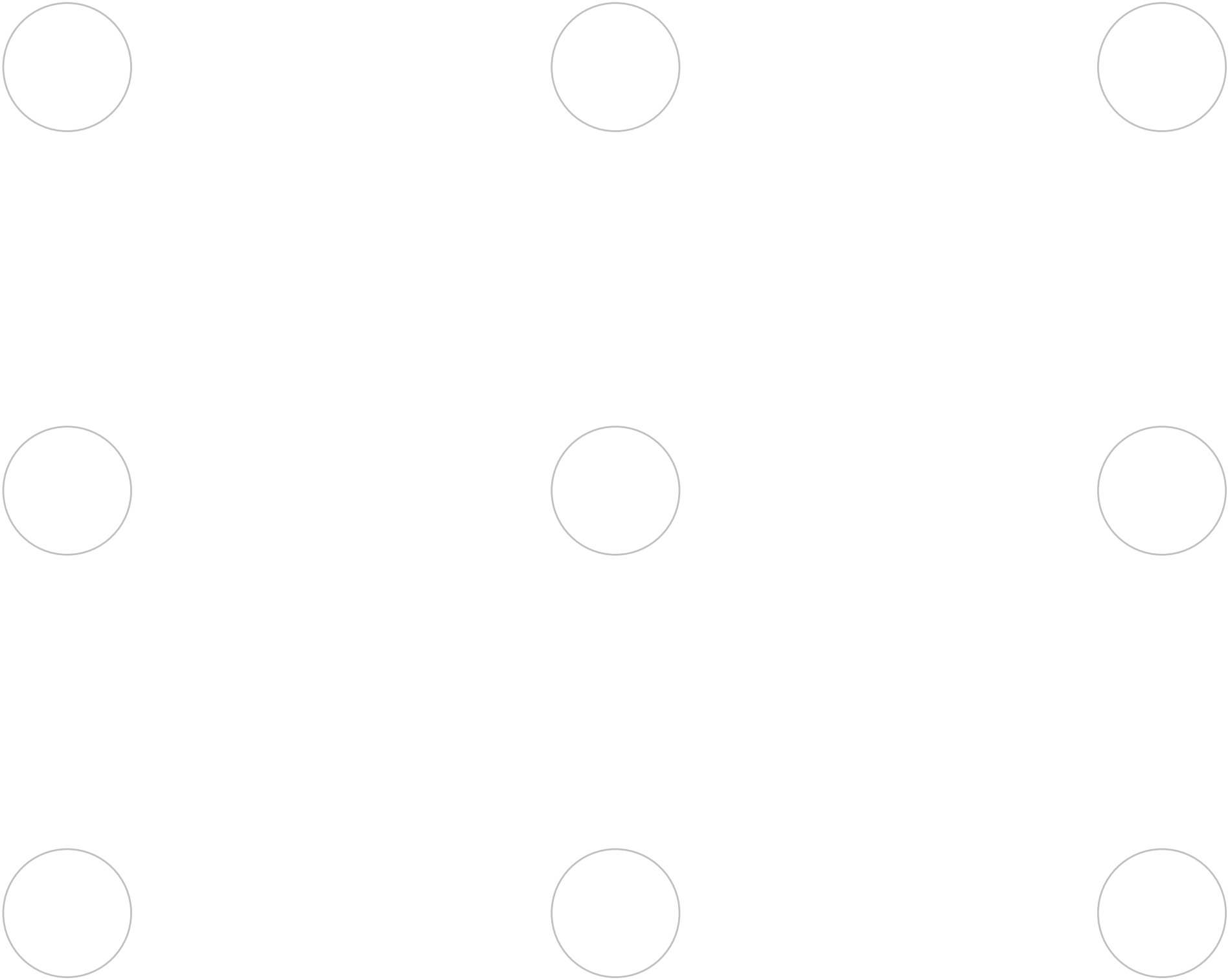
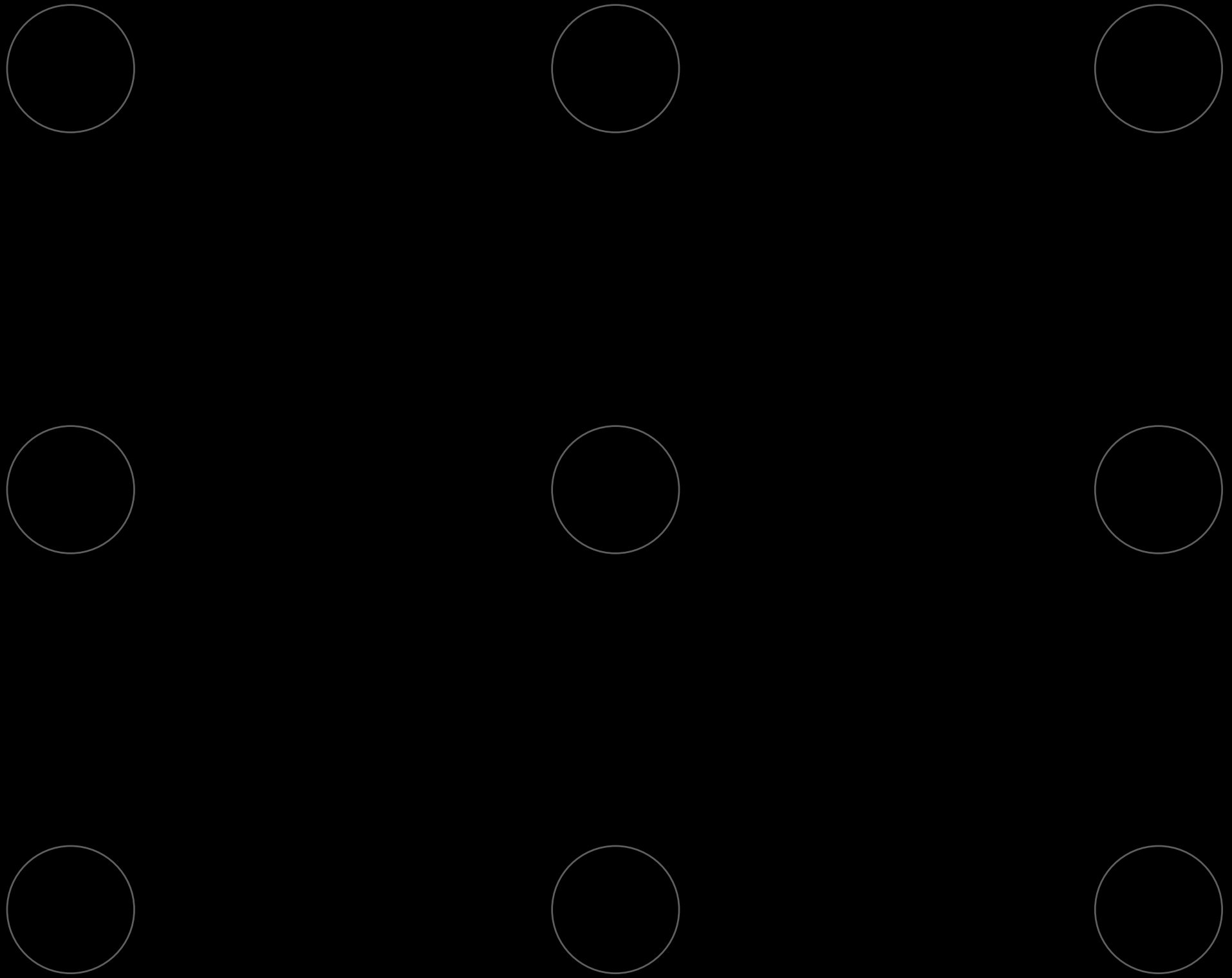
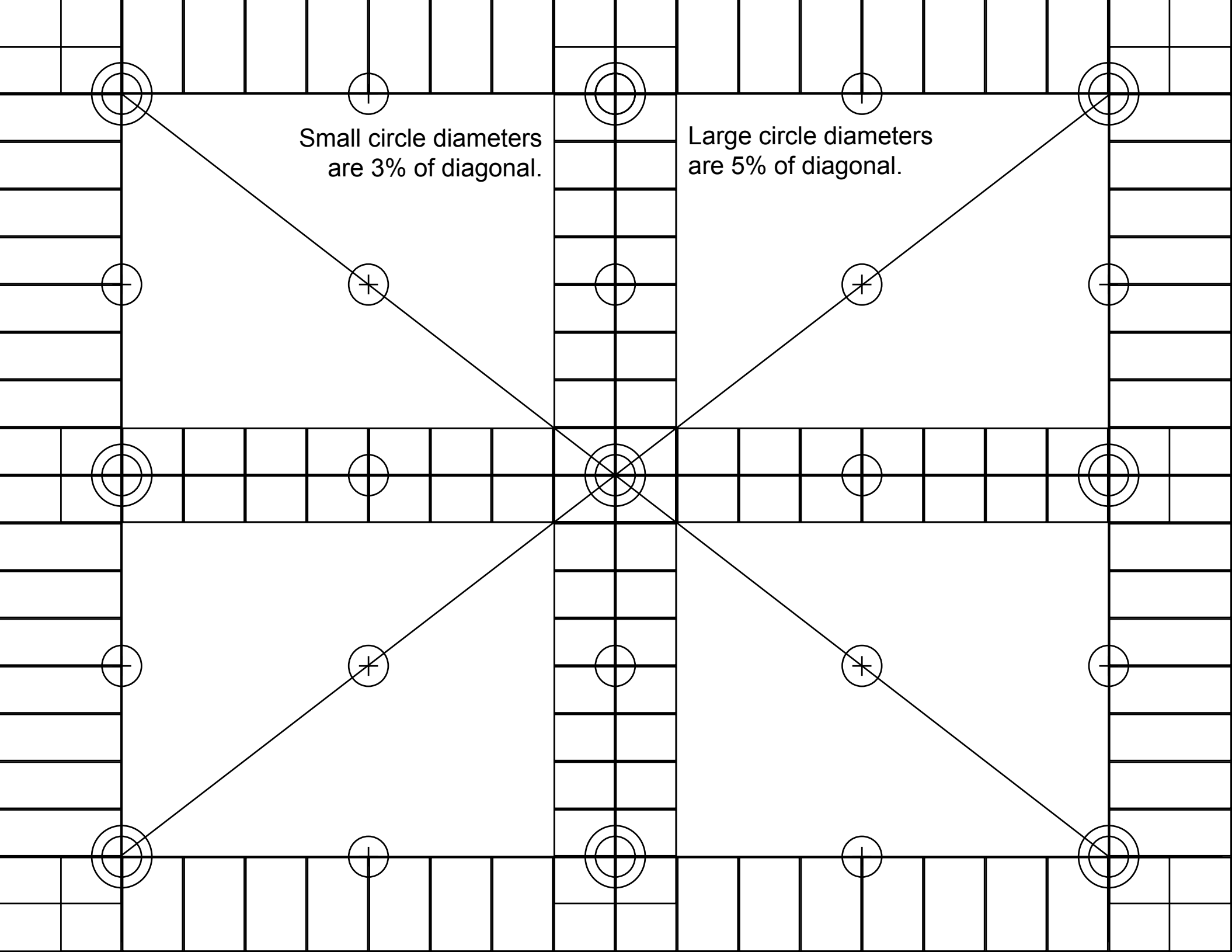
50% Gray (127/255)

Dark Gray (66/255)

0 (0/255)






Small circle diameters
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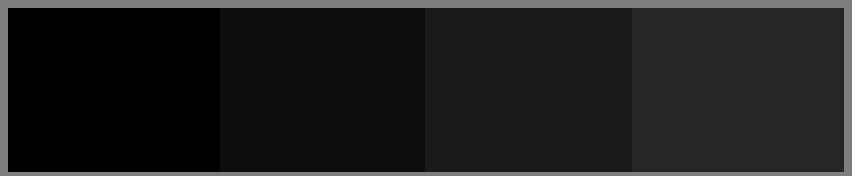
are 5% of diagonal.

0%, 5%, 10%, 15% (0, 13, 25, 38) ; 85%, 90%, 95%, 100% (216, 229, 242, 255)



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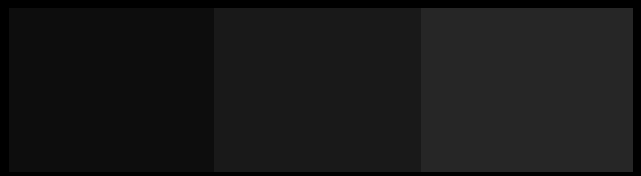

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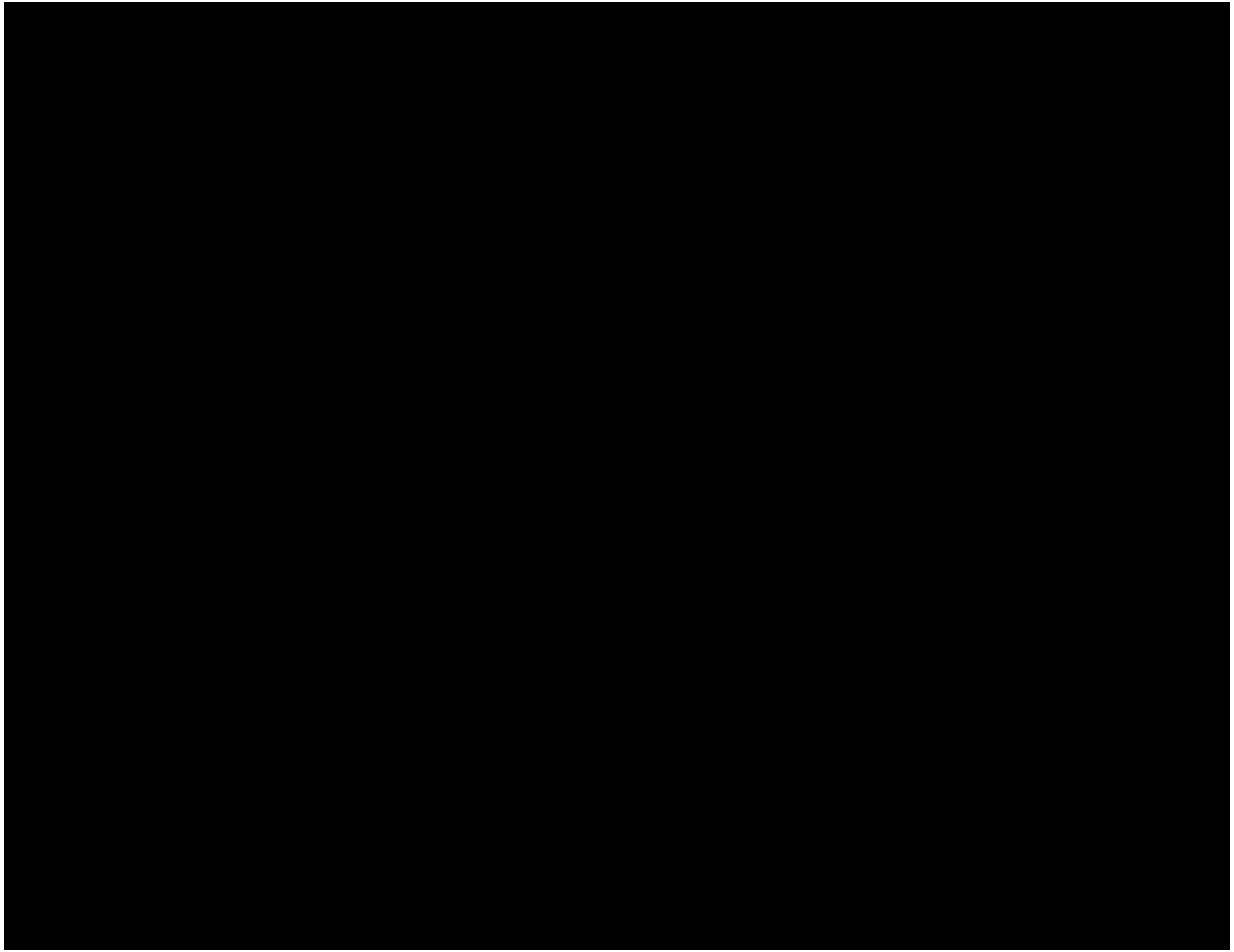

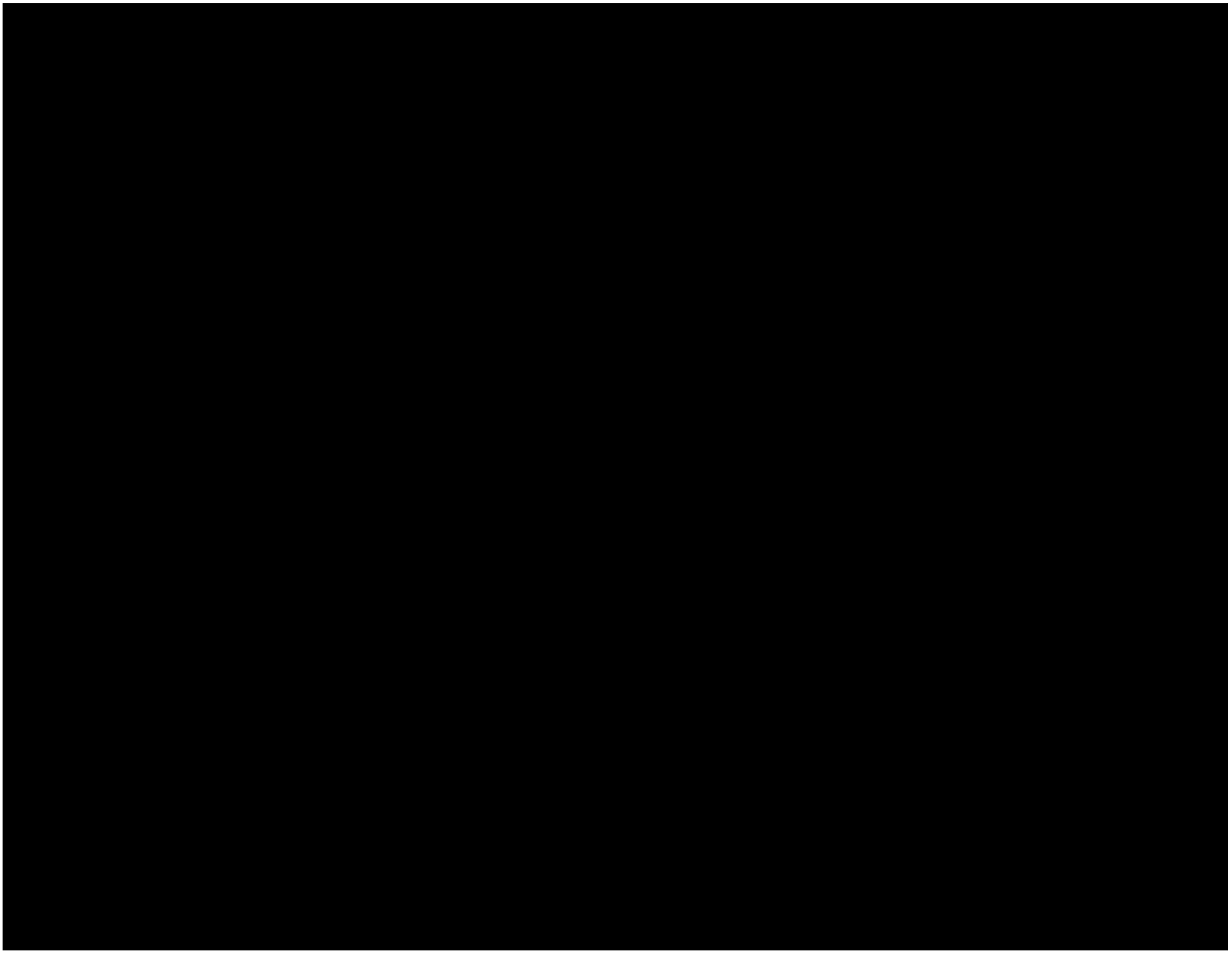

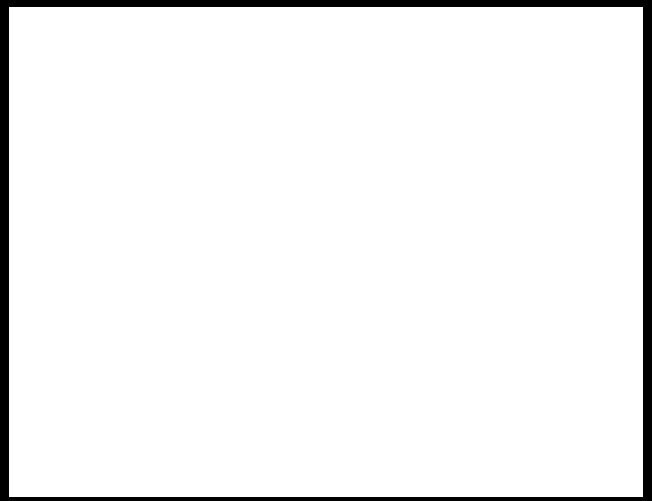

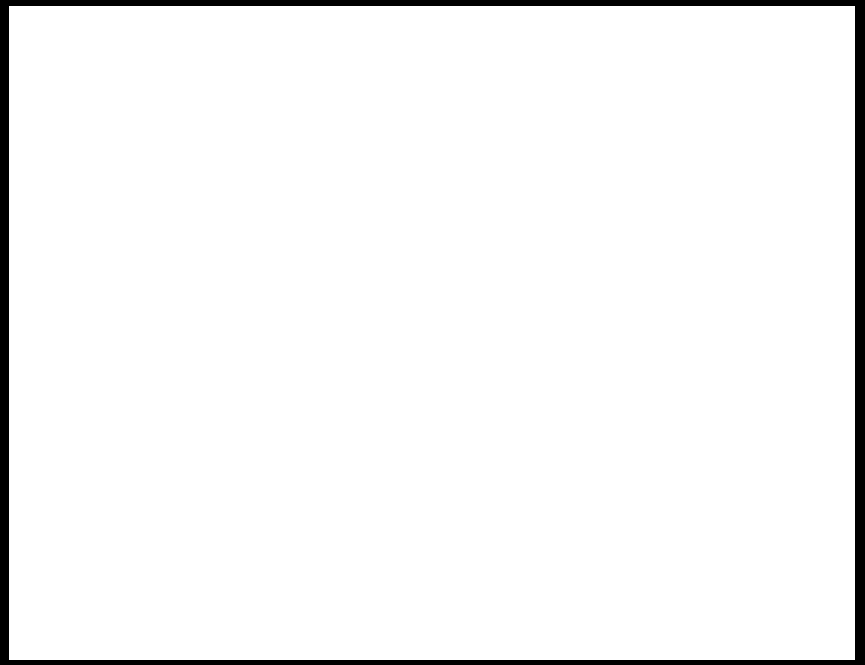

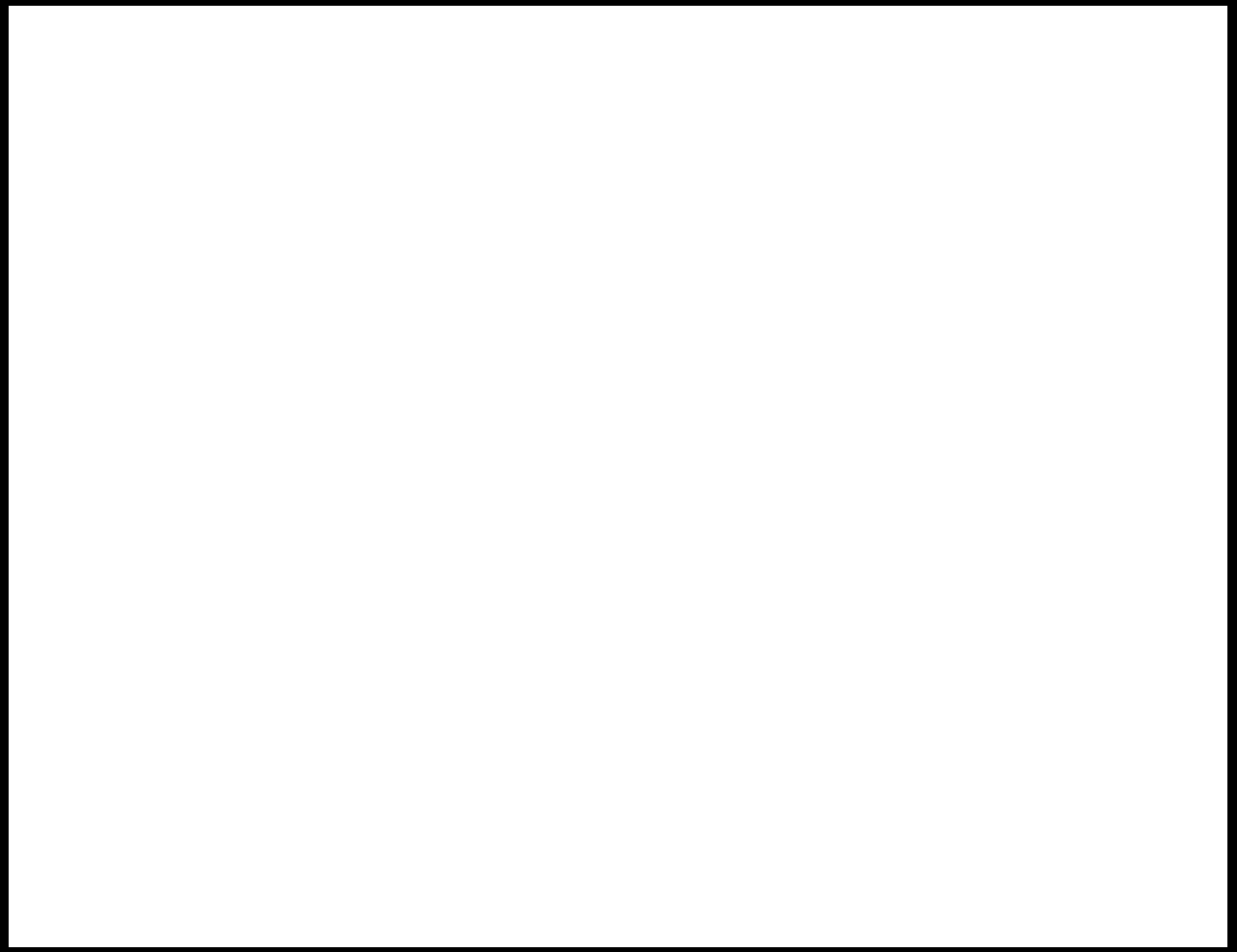

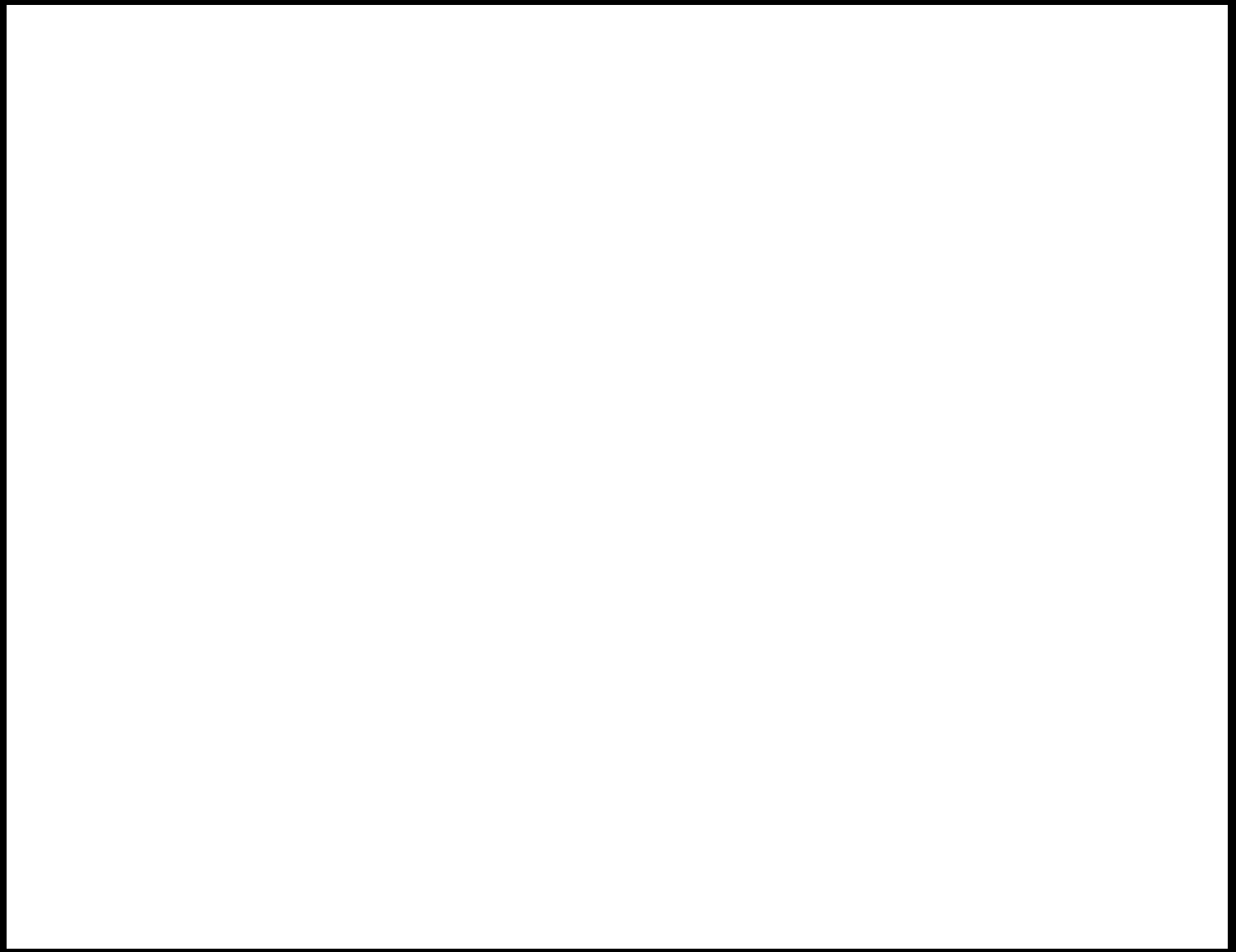

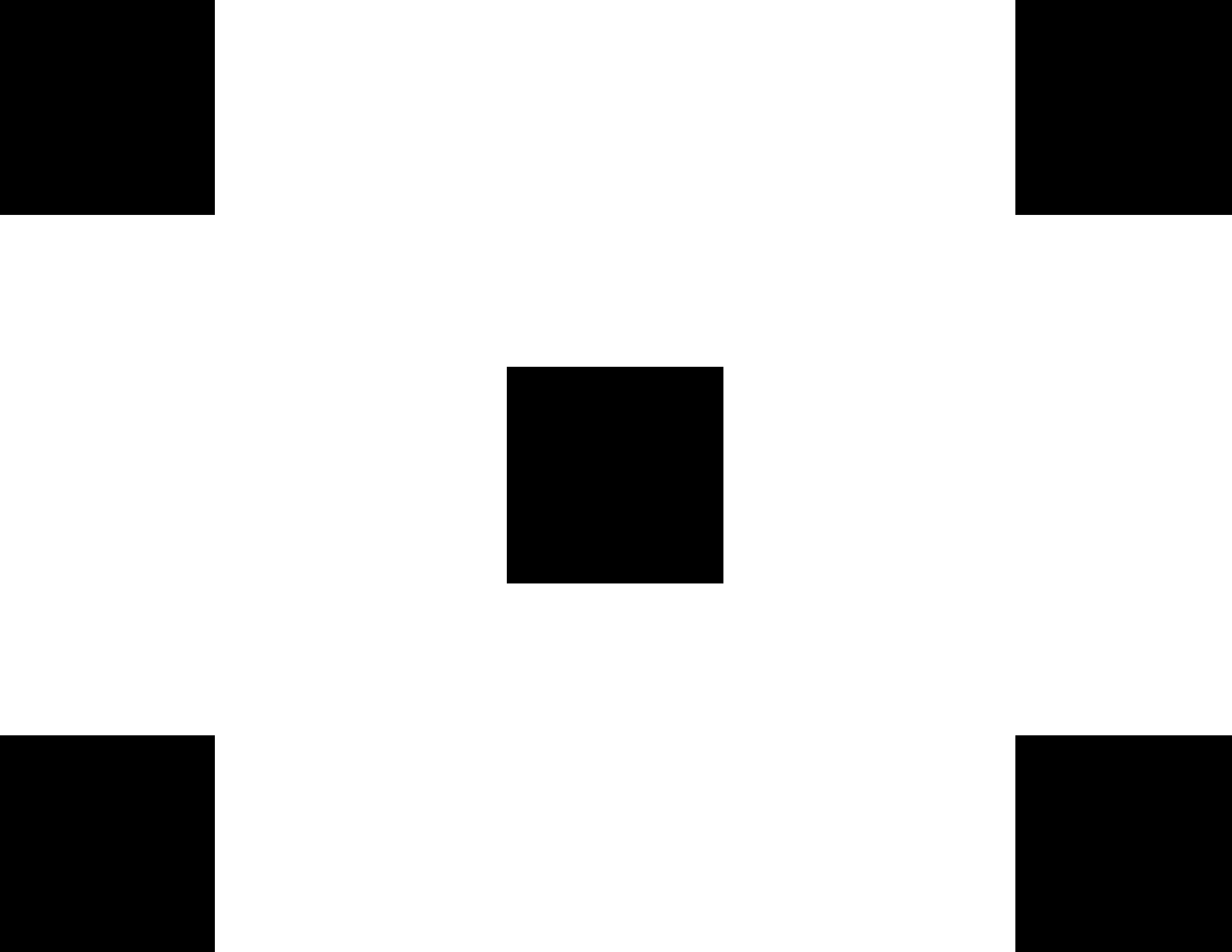

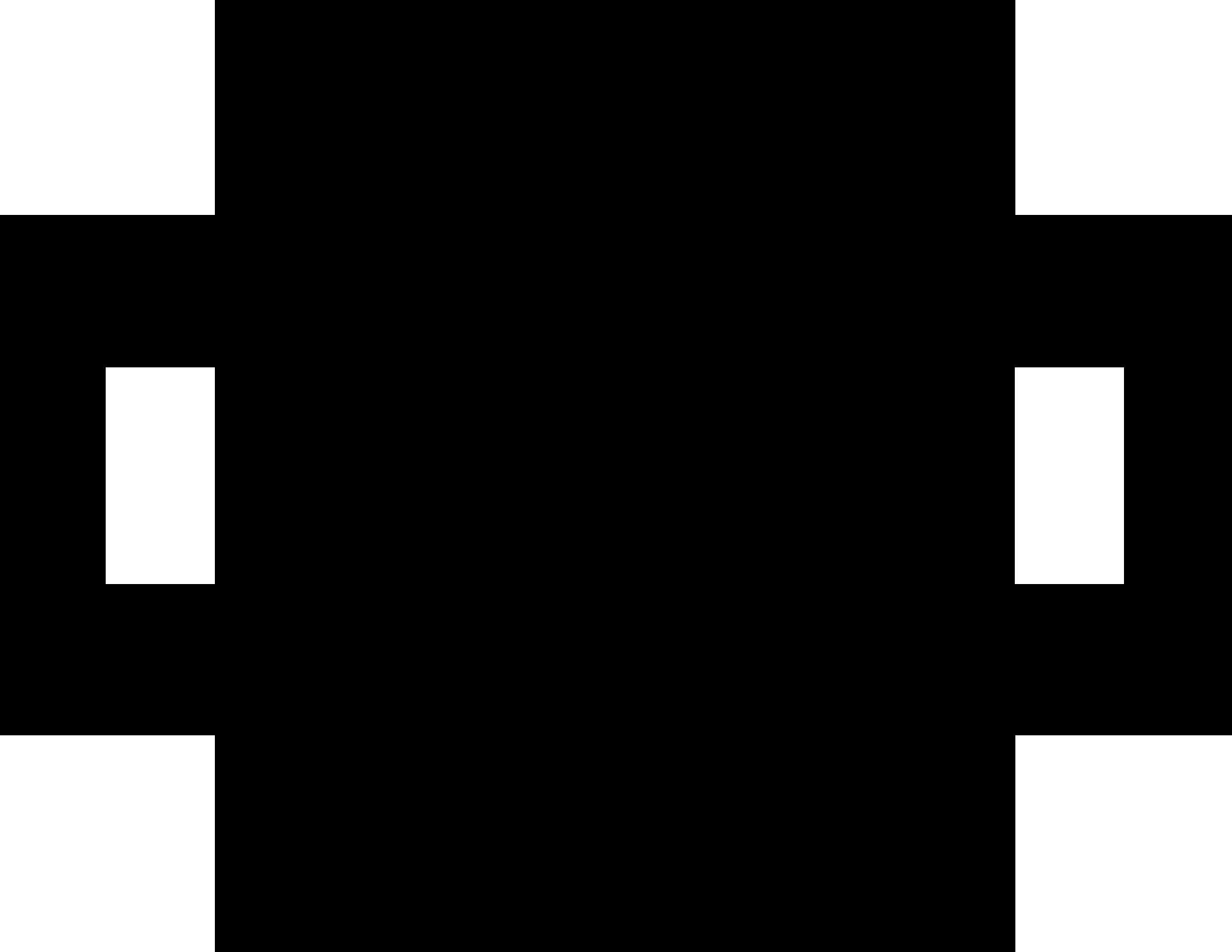

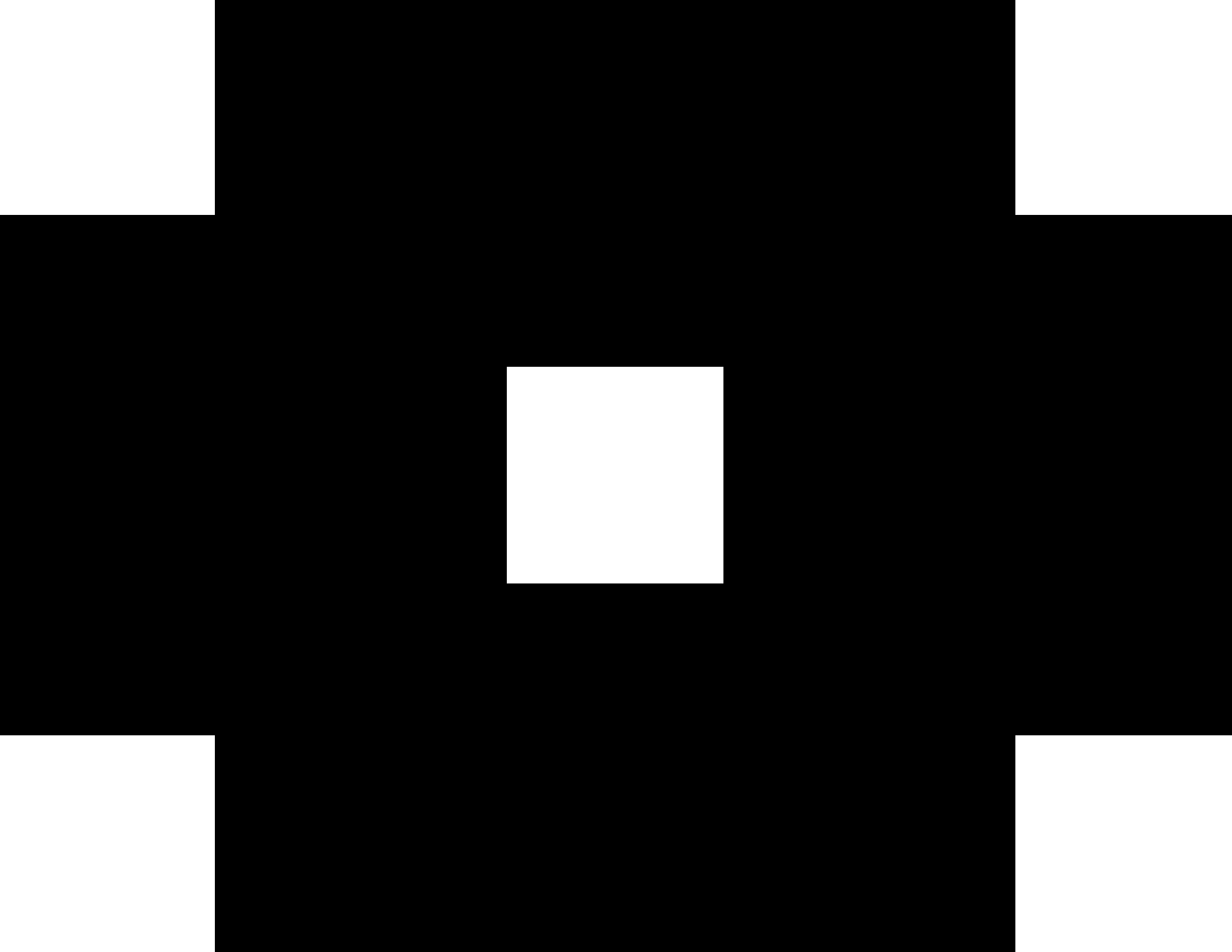

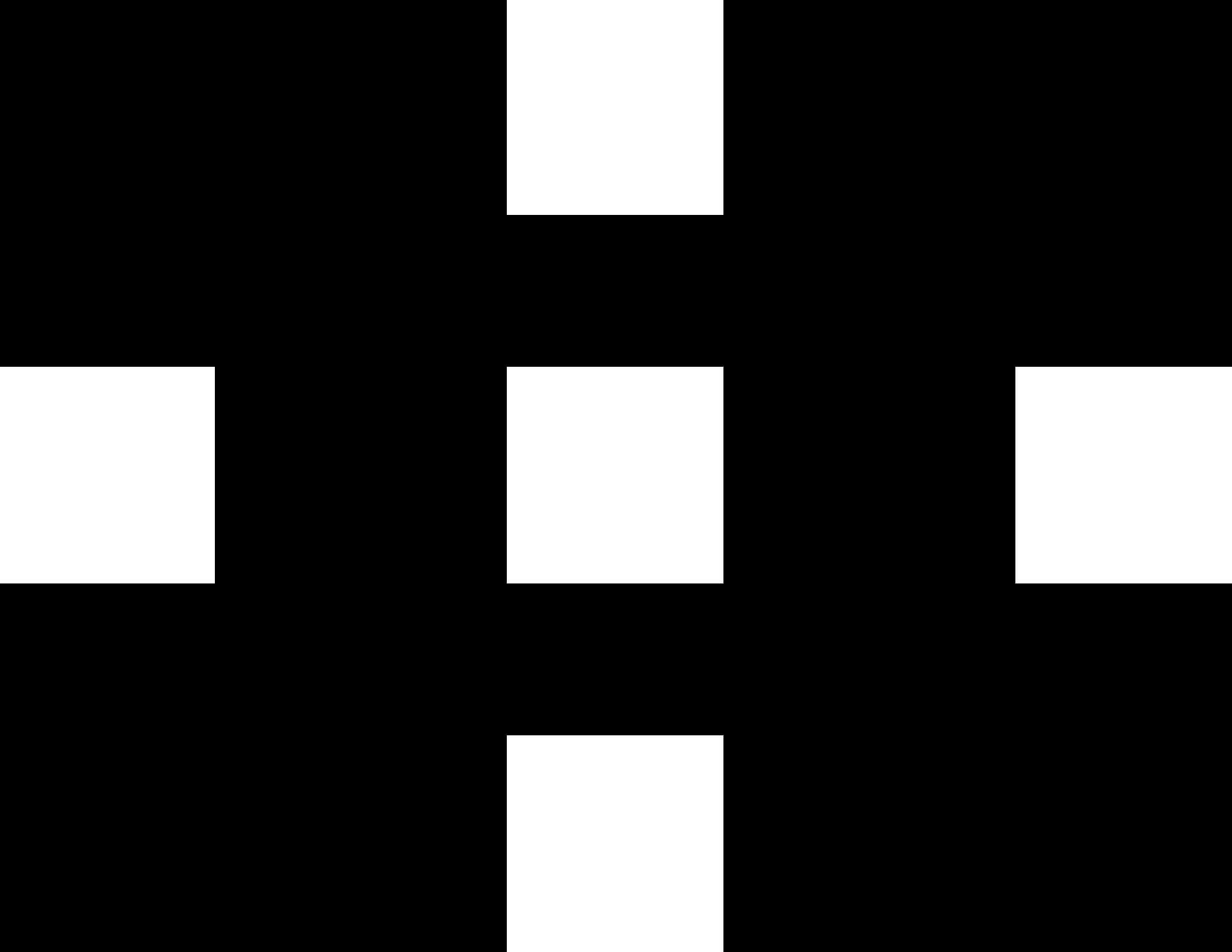

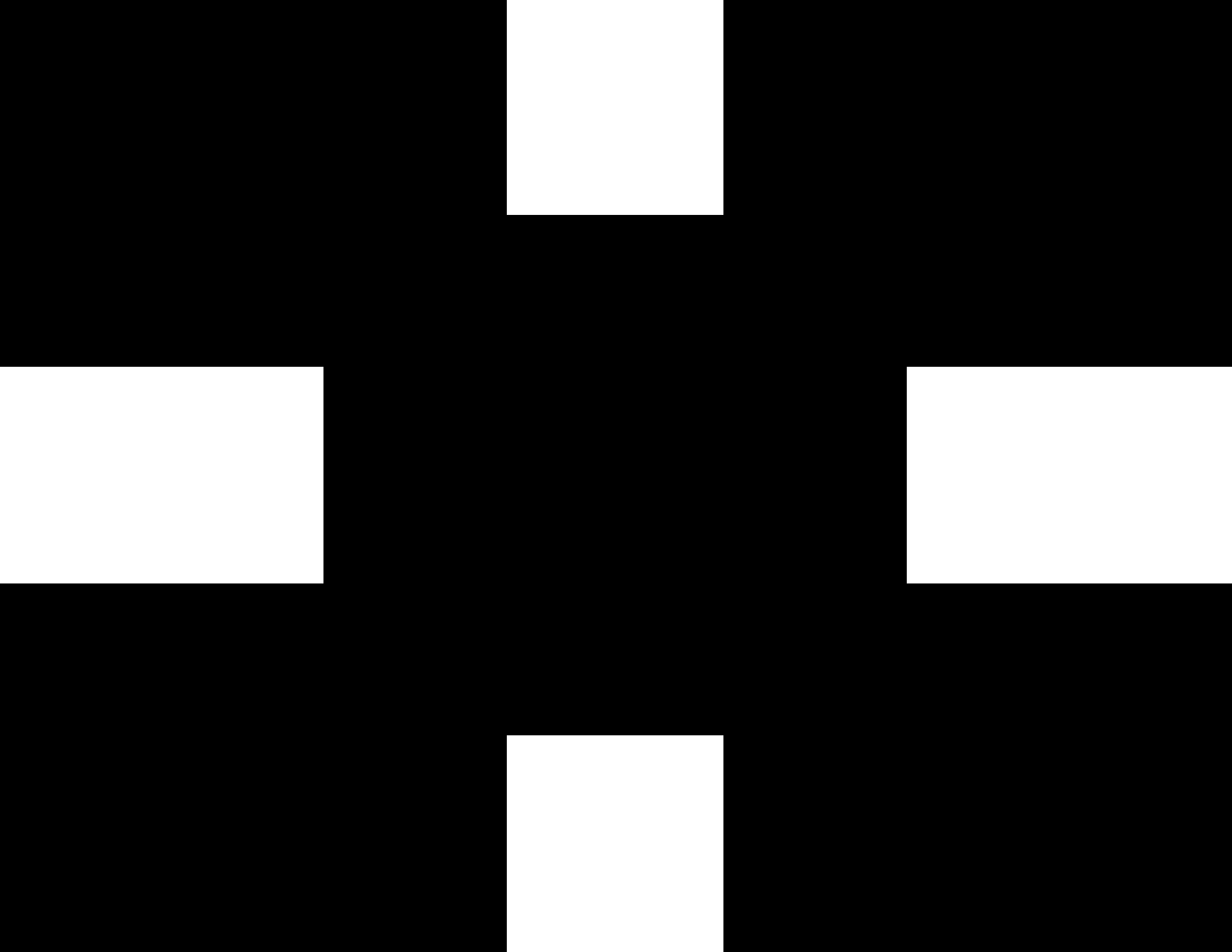

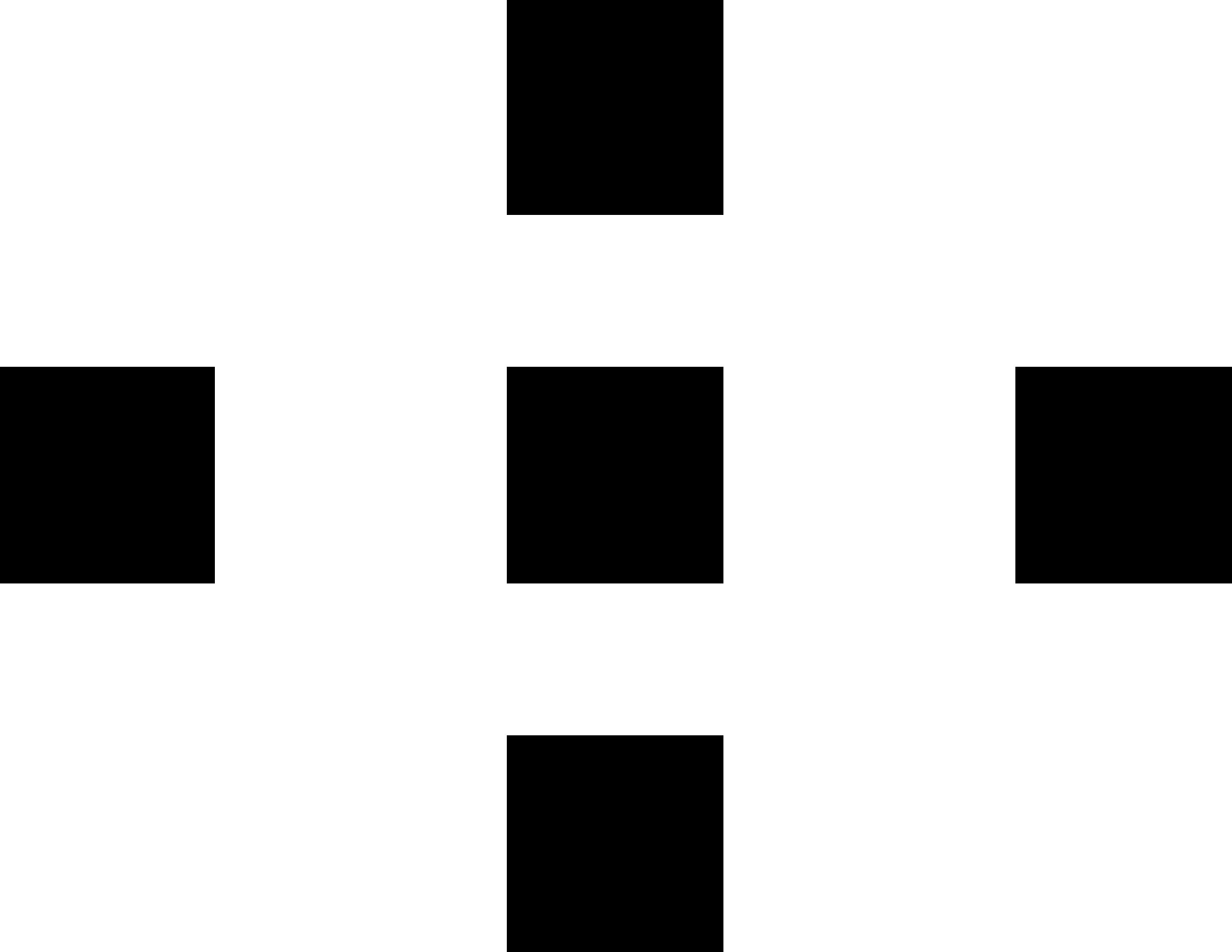

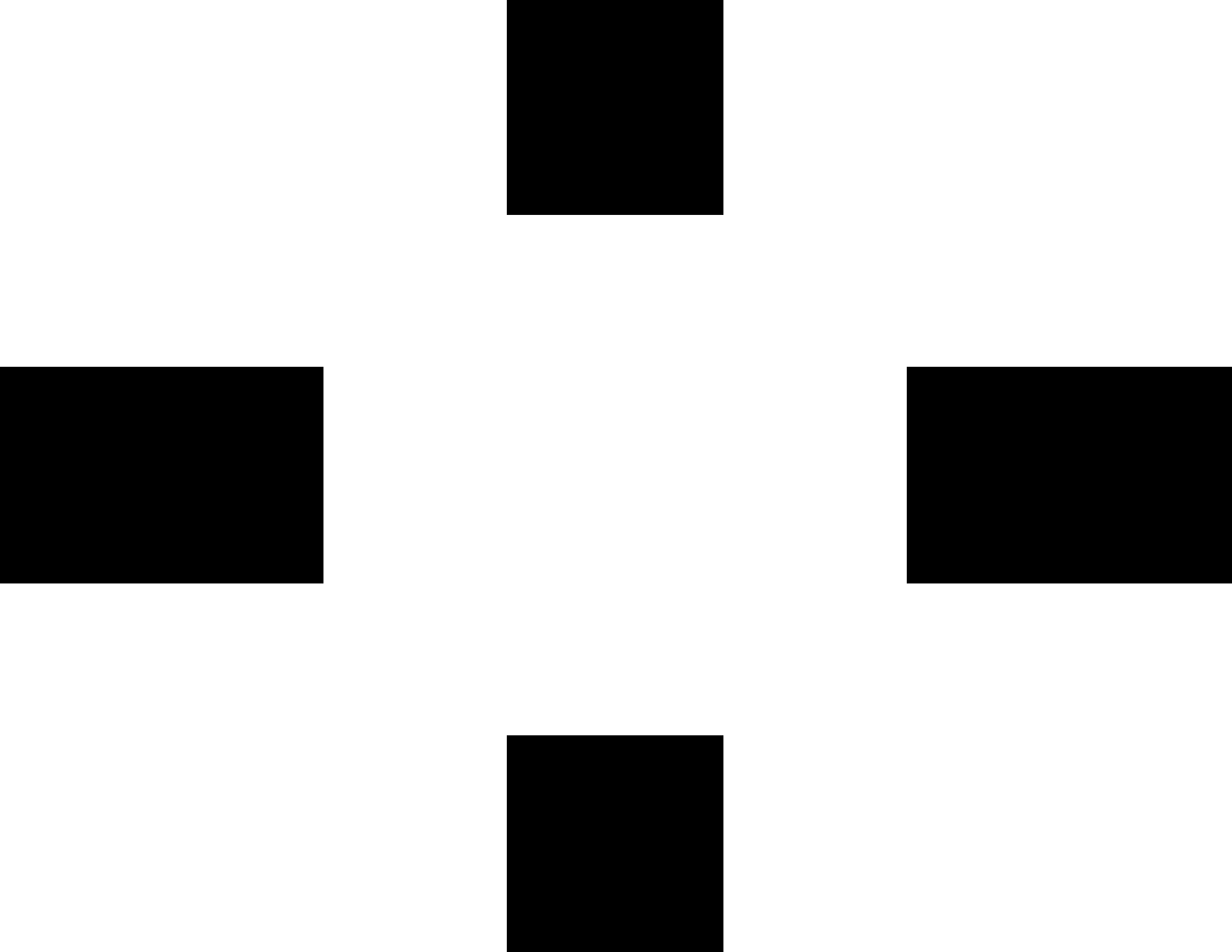

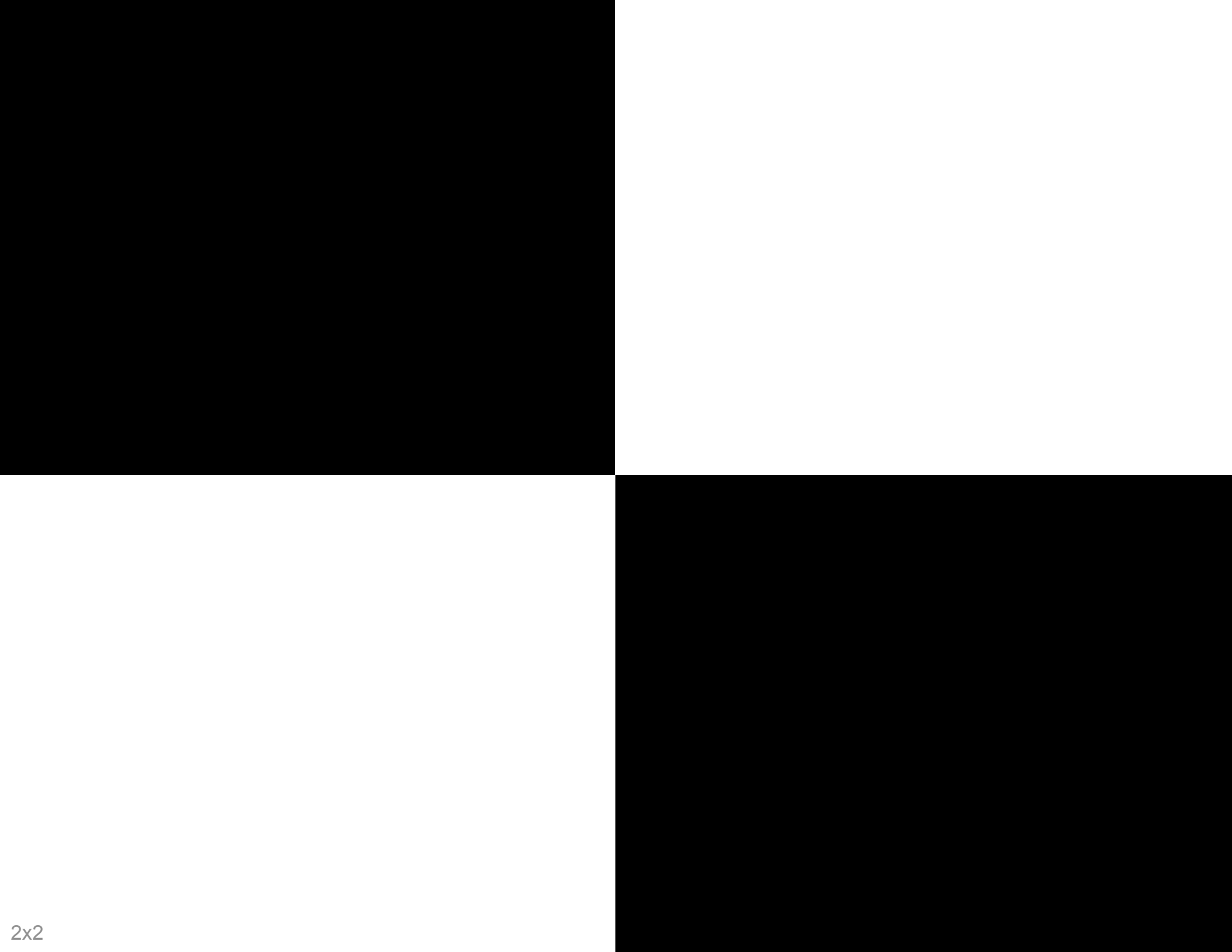

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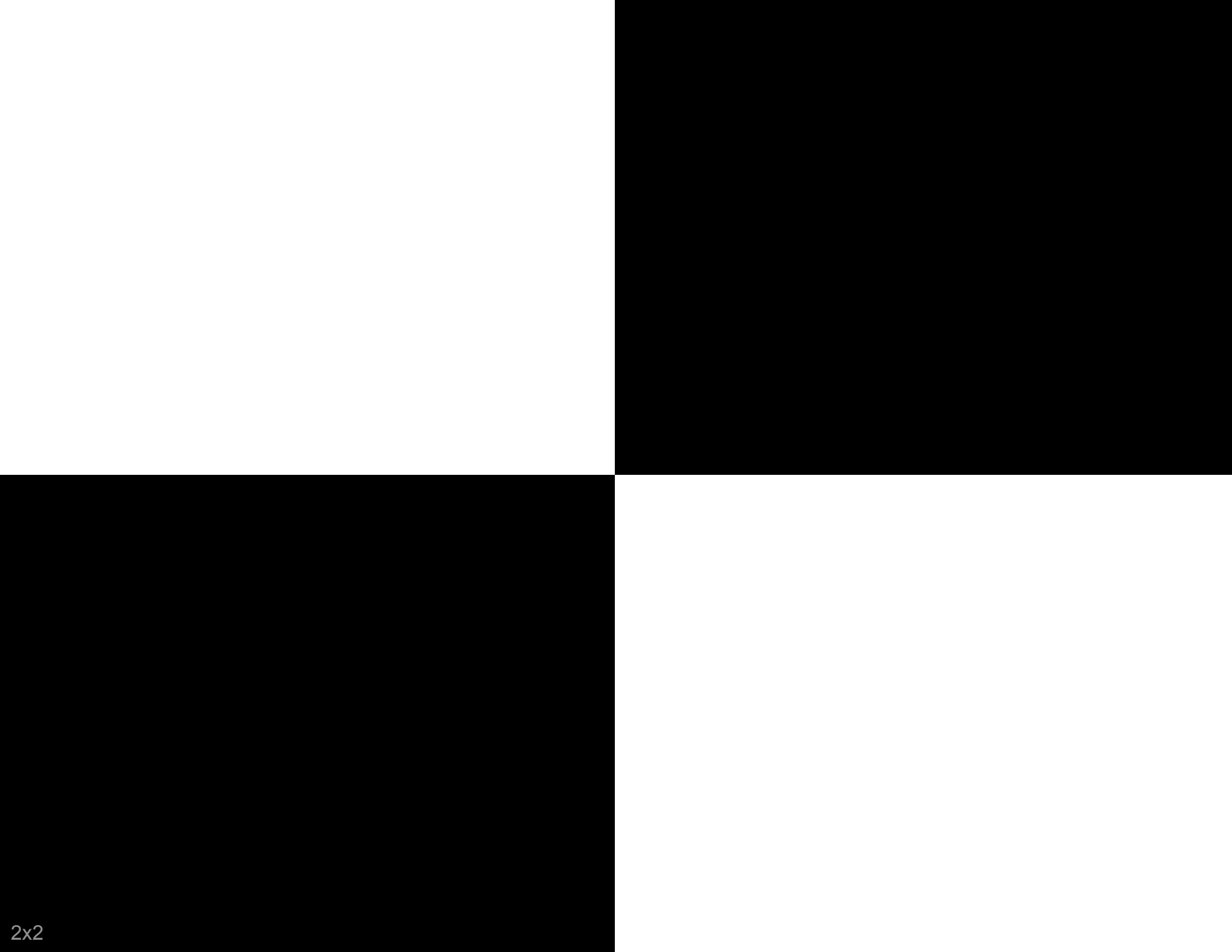
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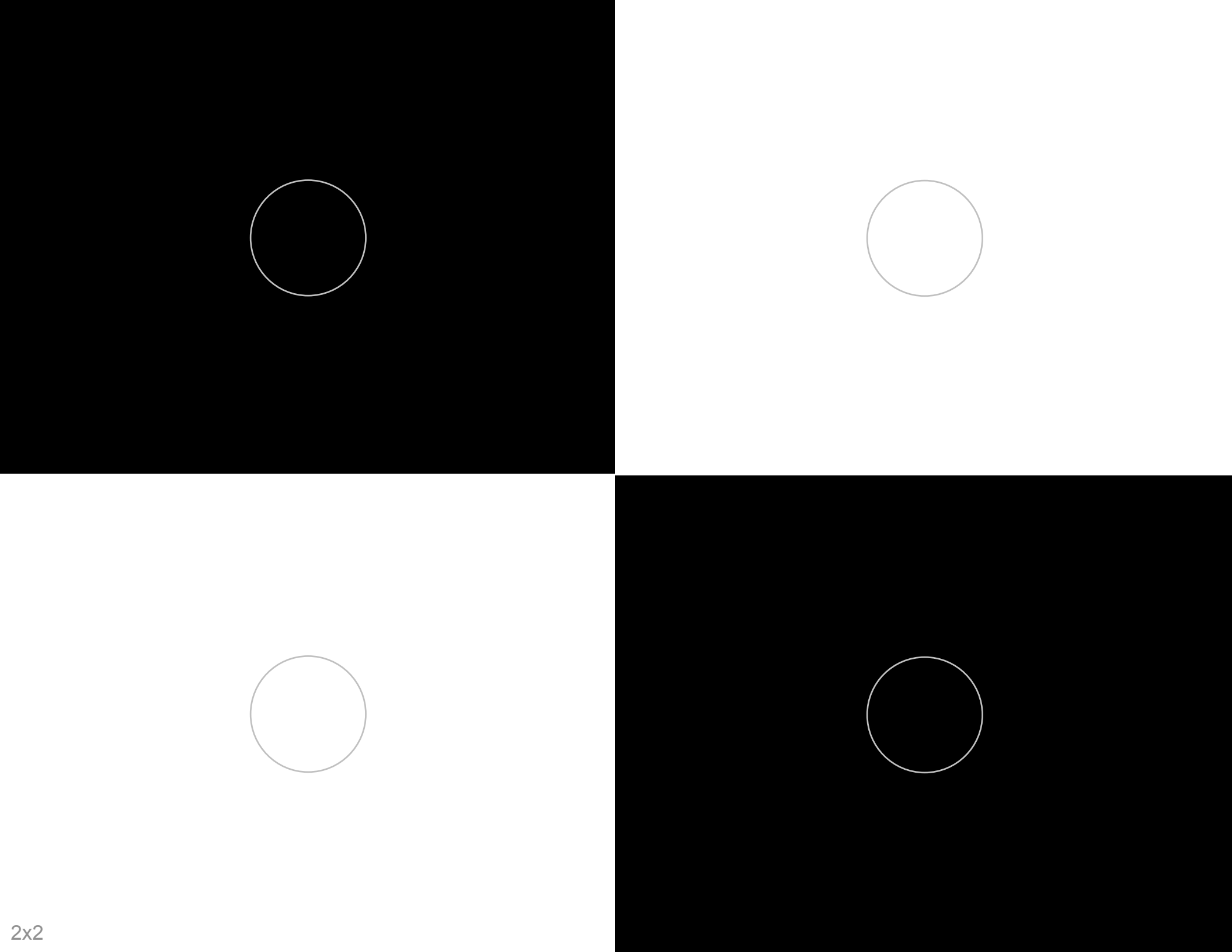

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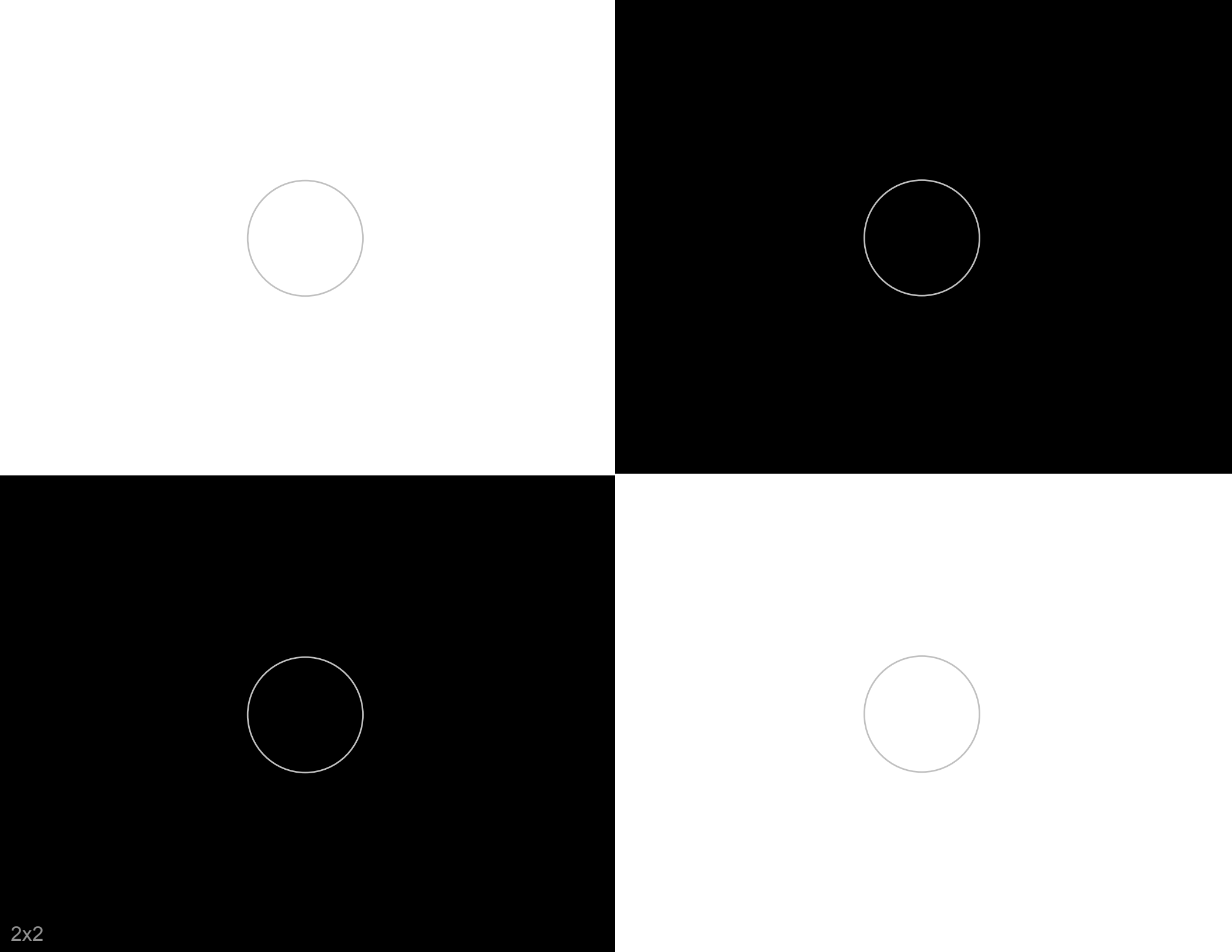
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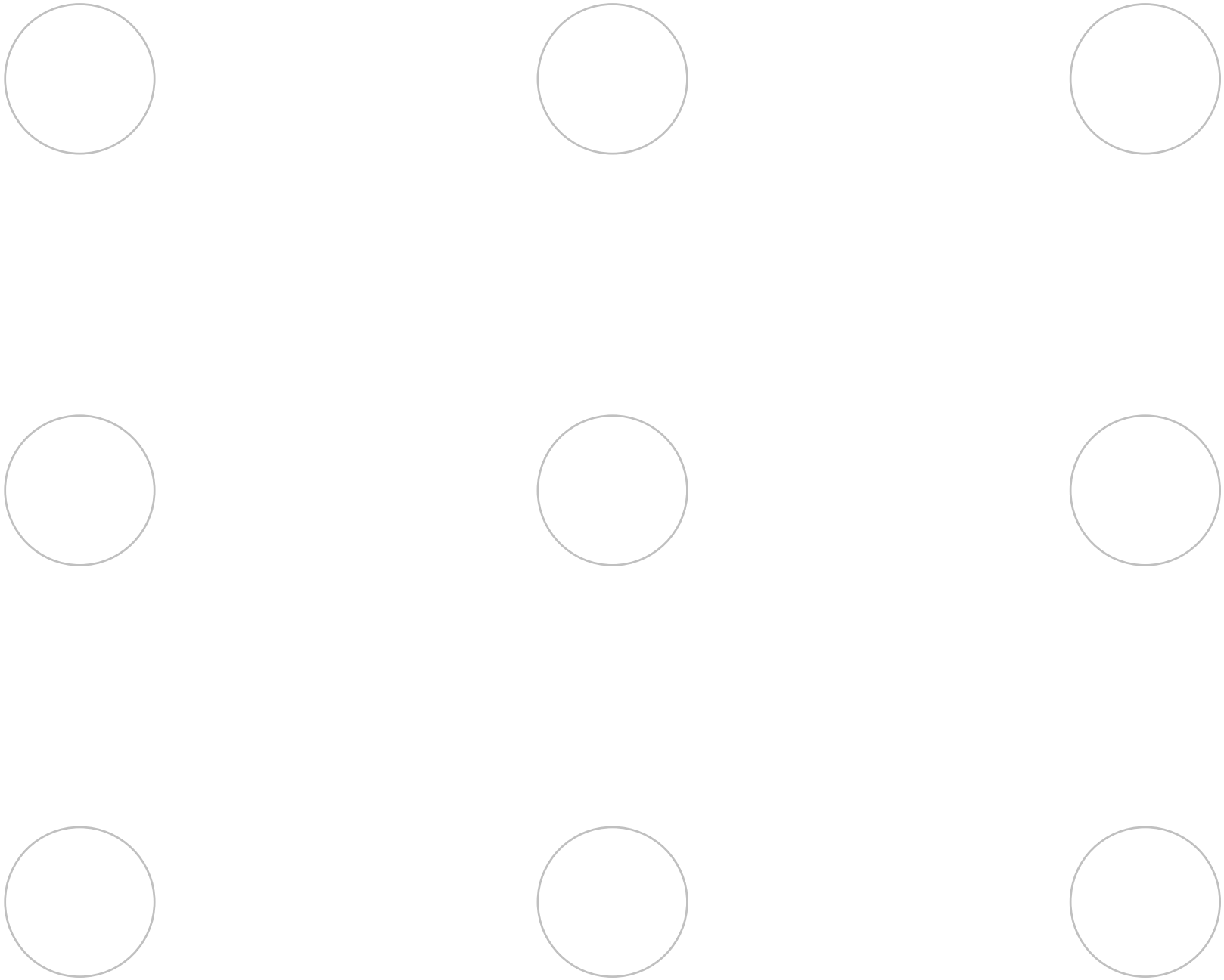

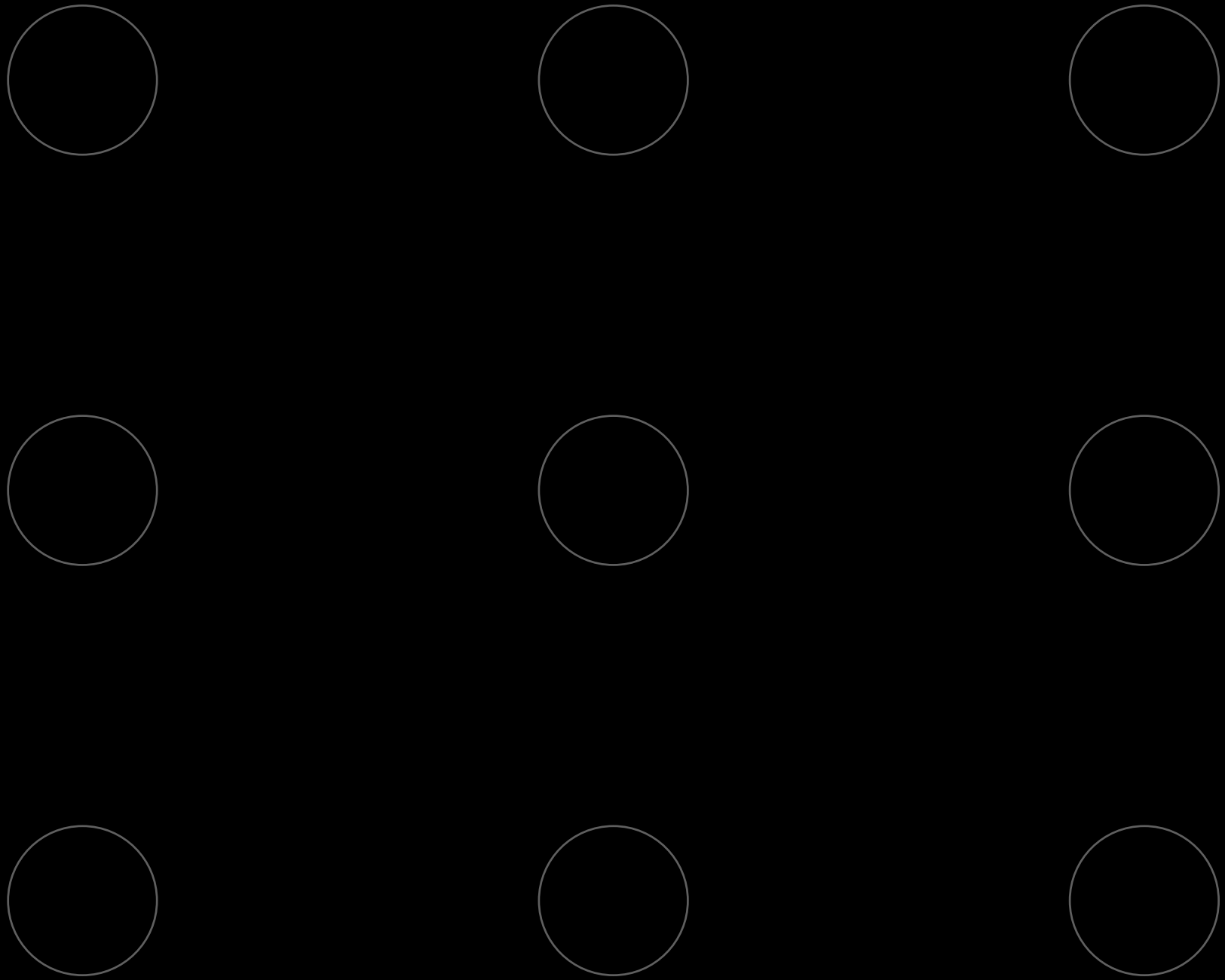

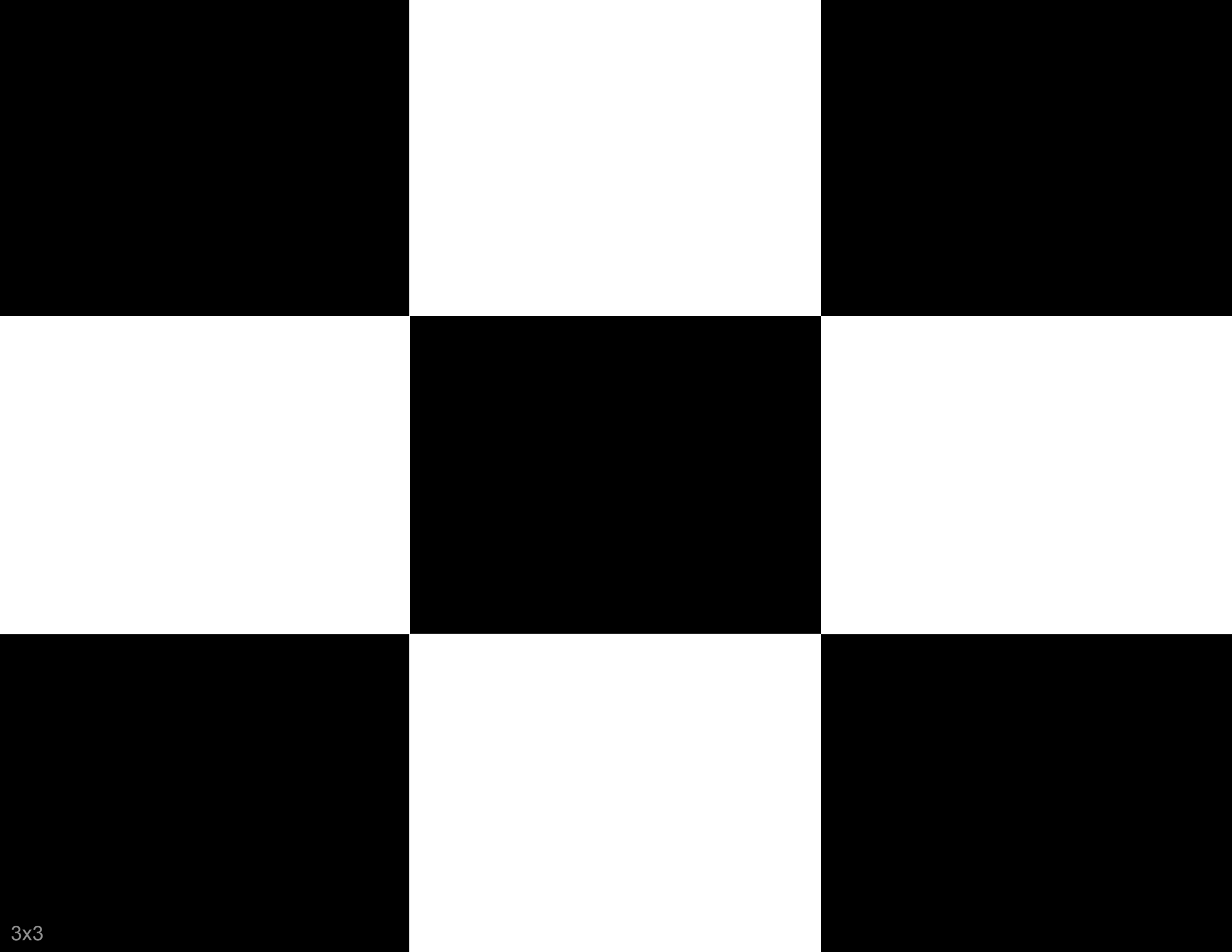
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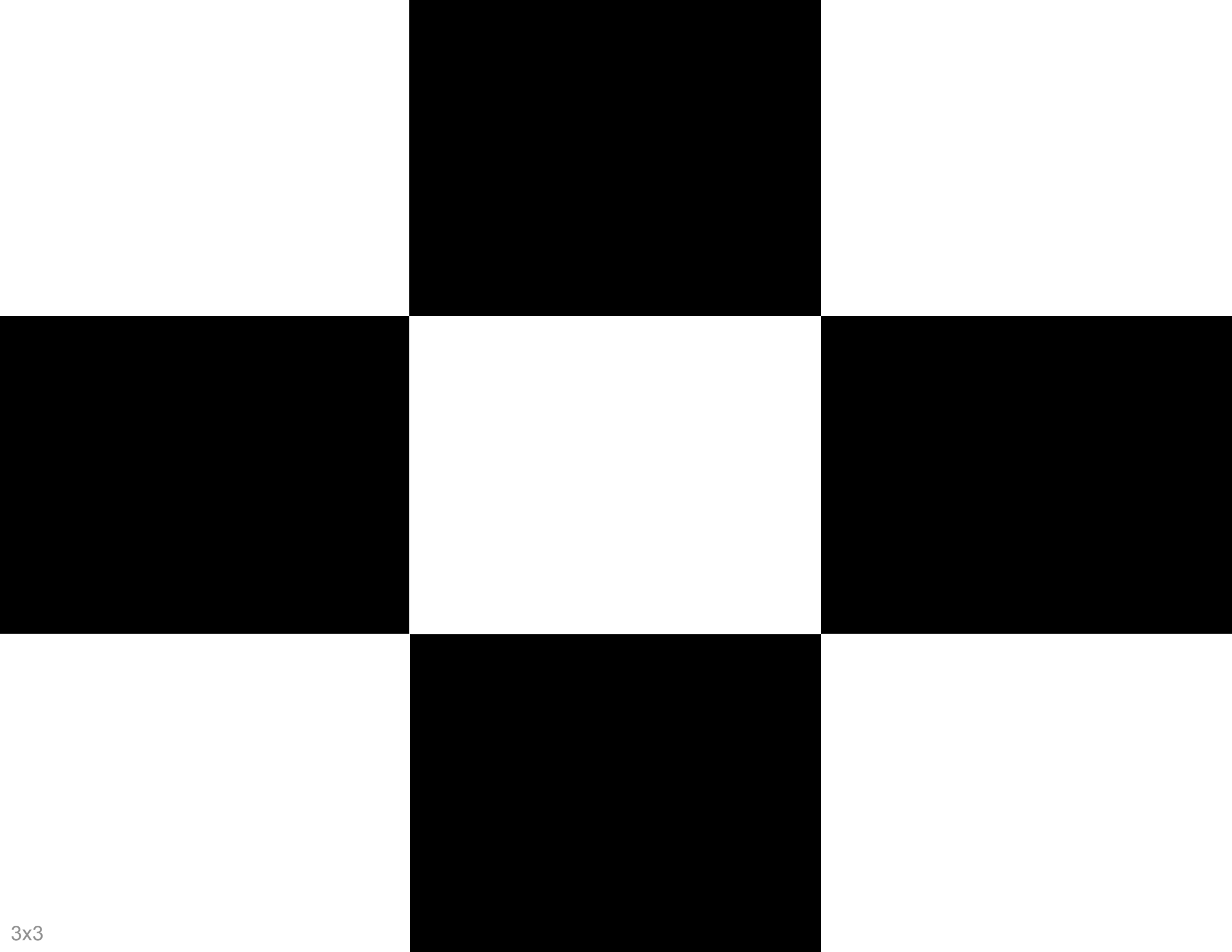

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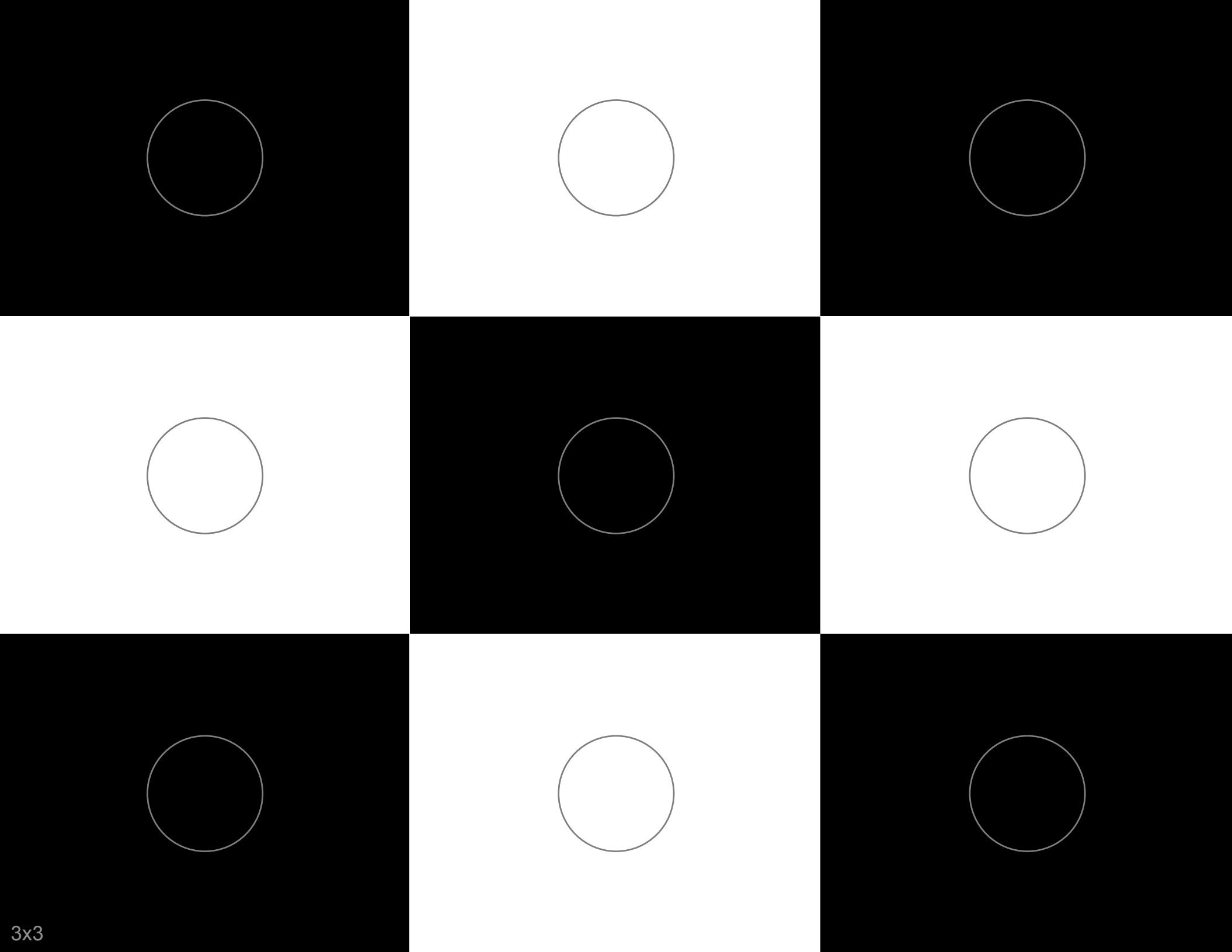
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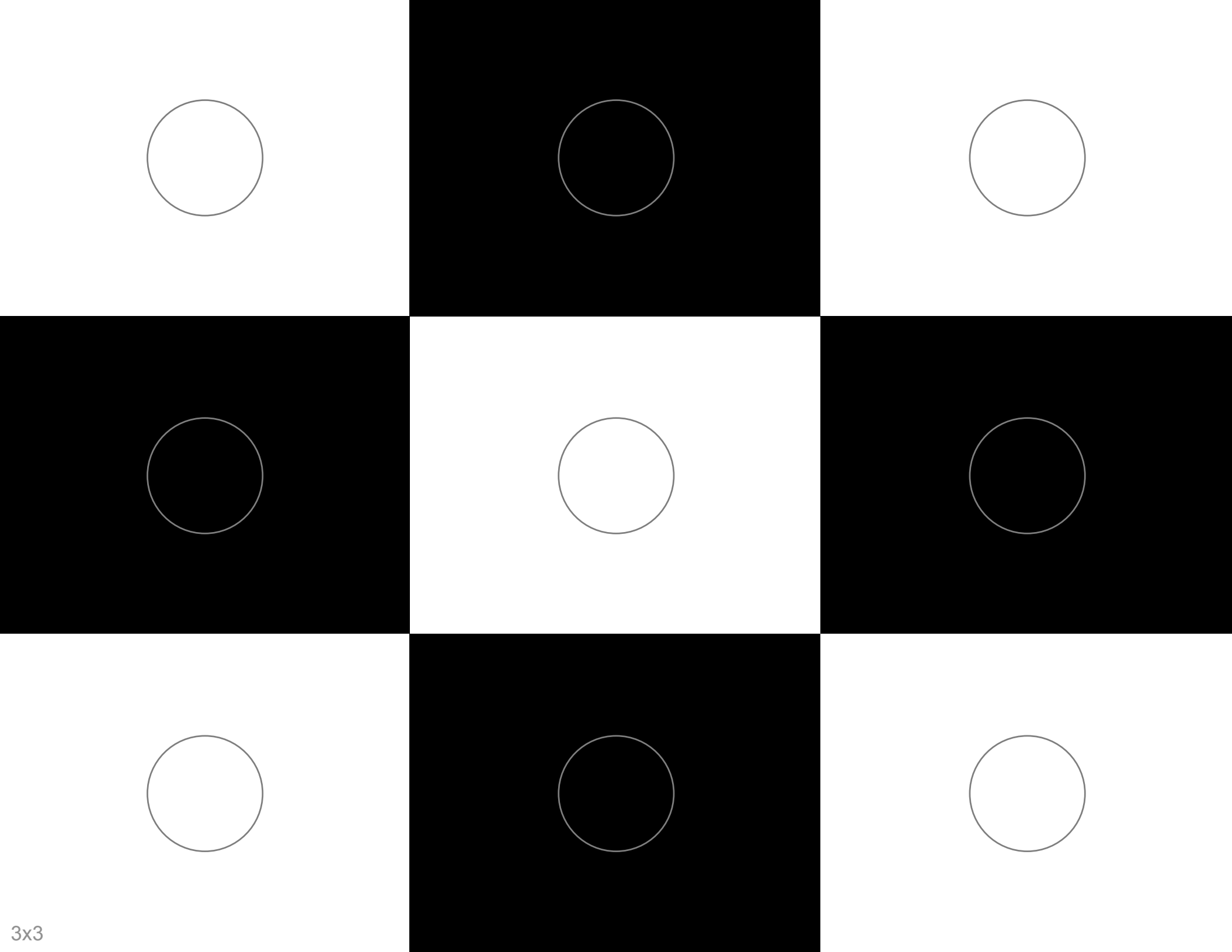

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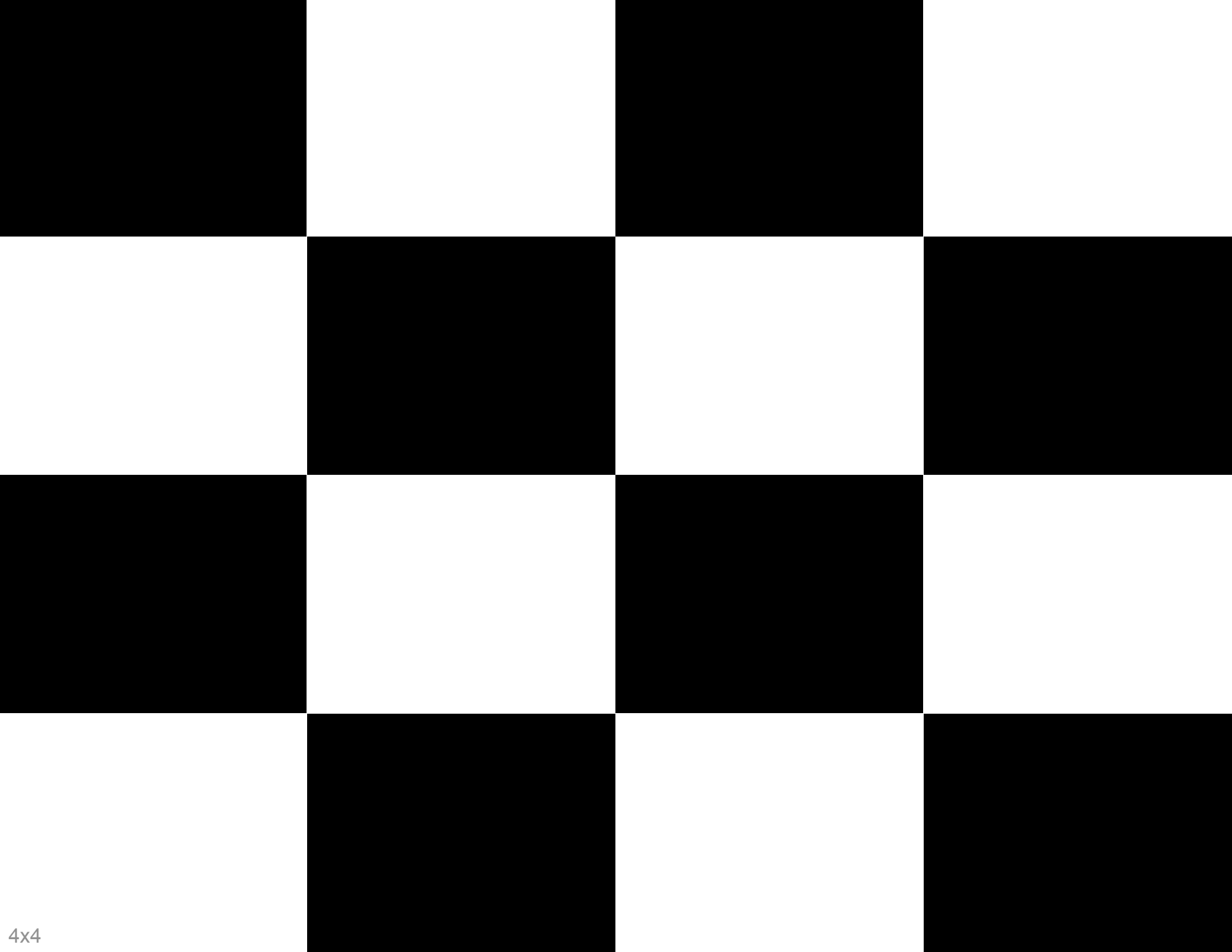
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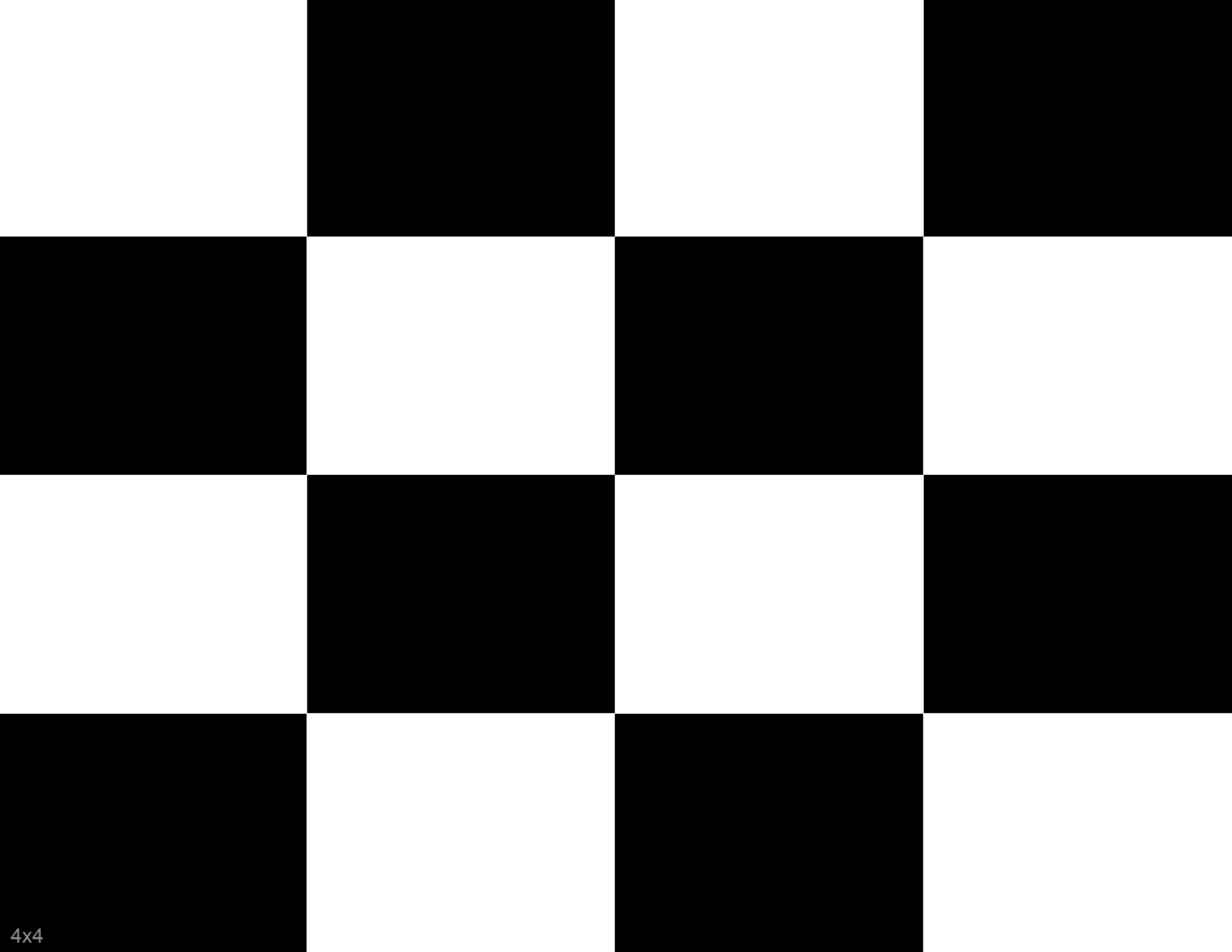
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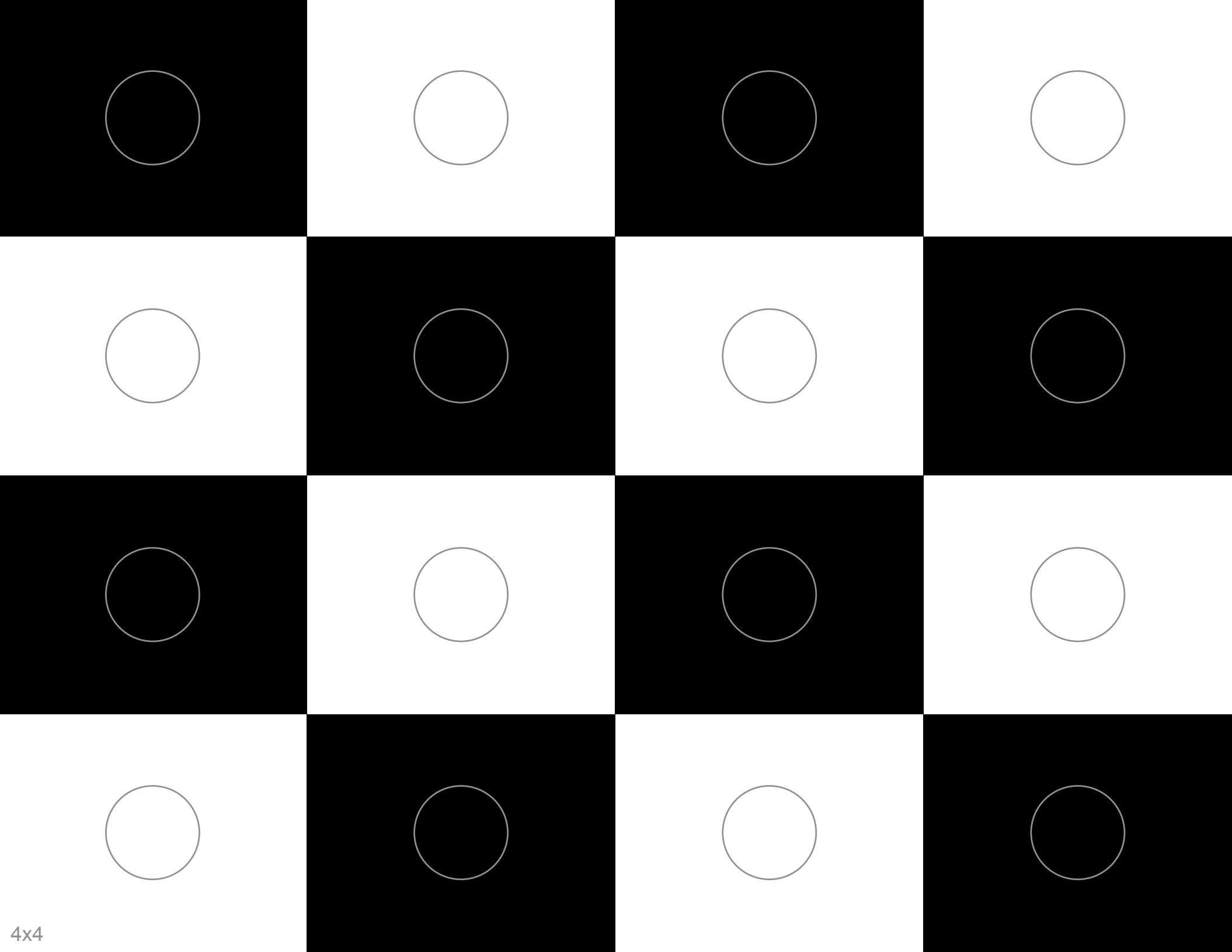
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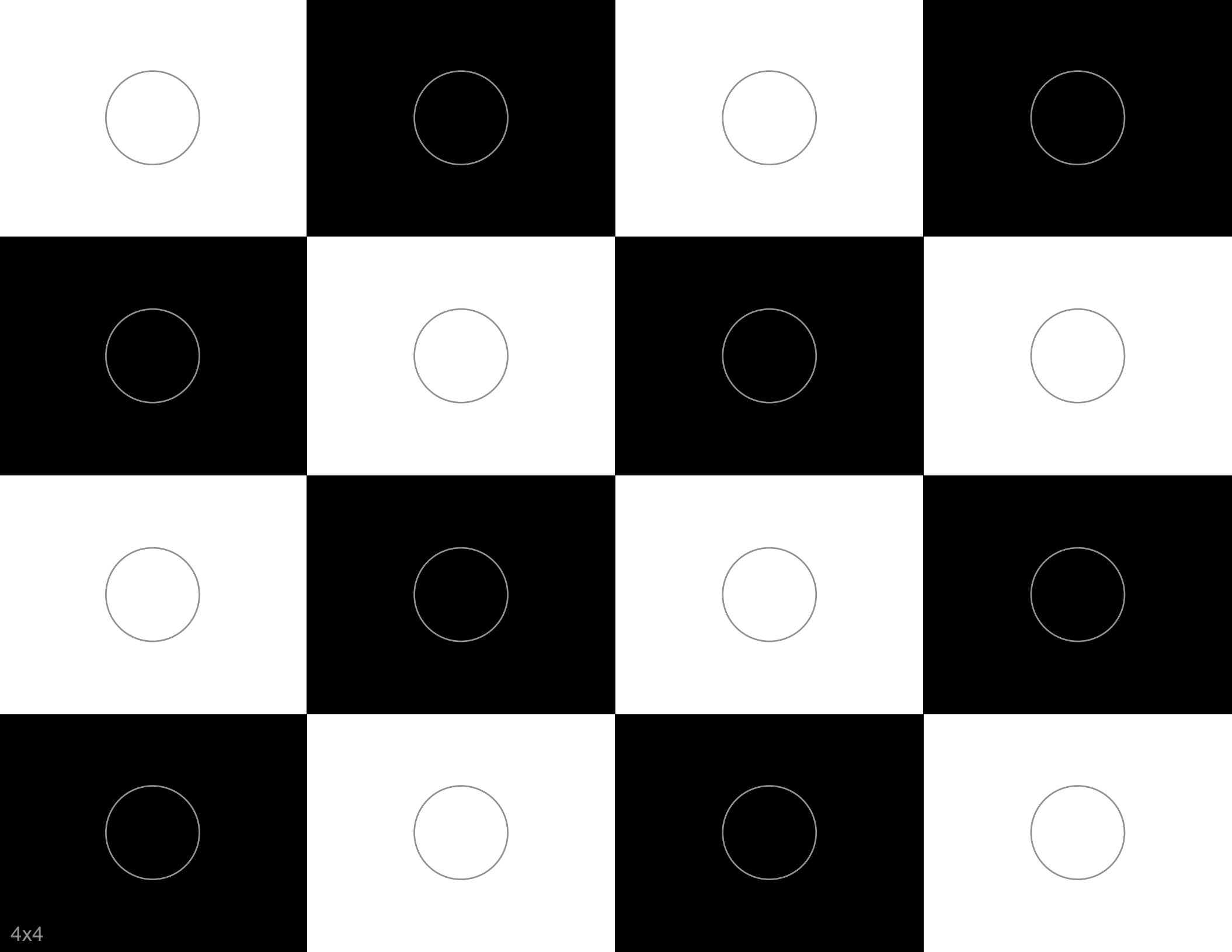
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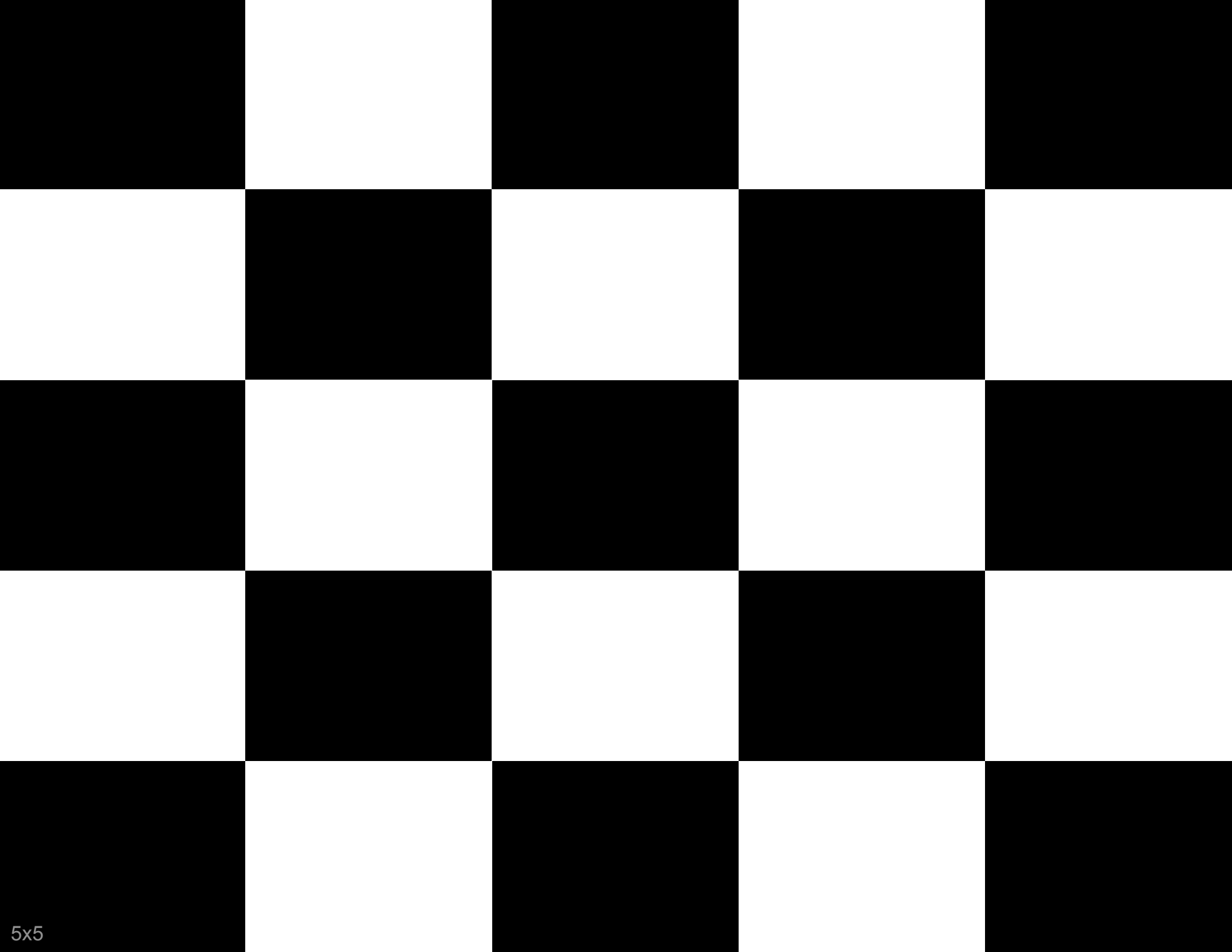
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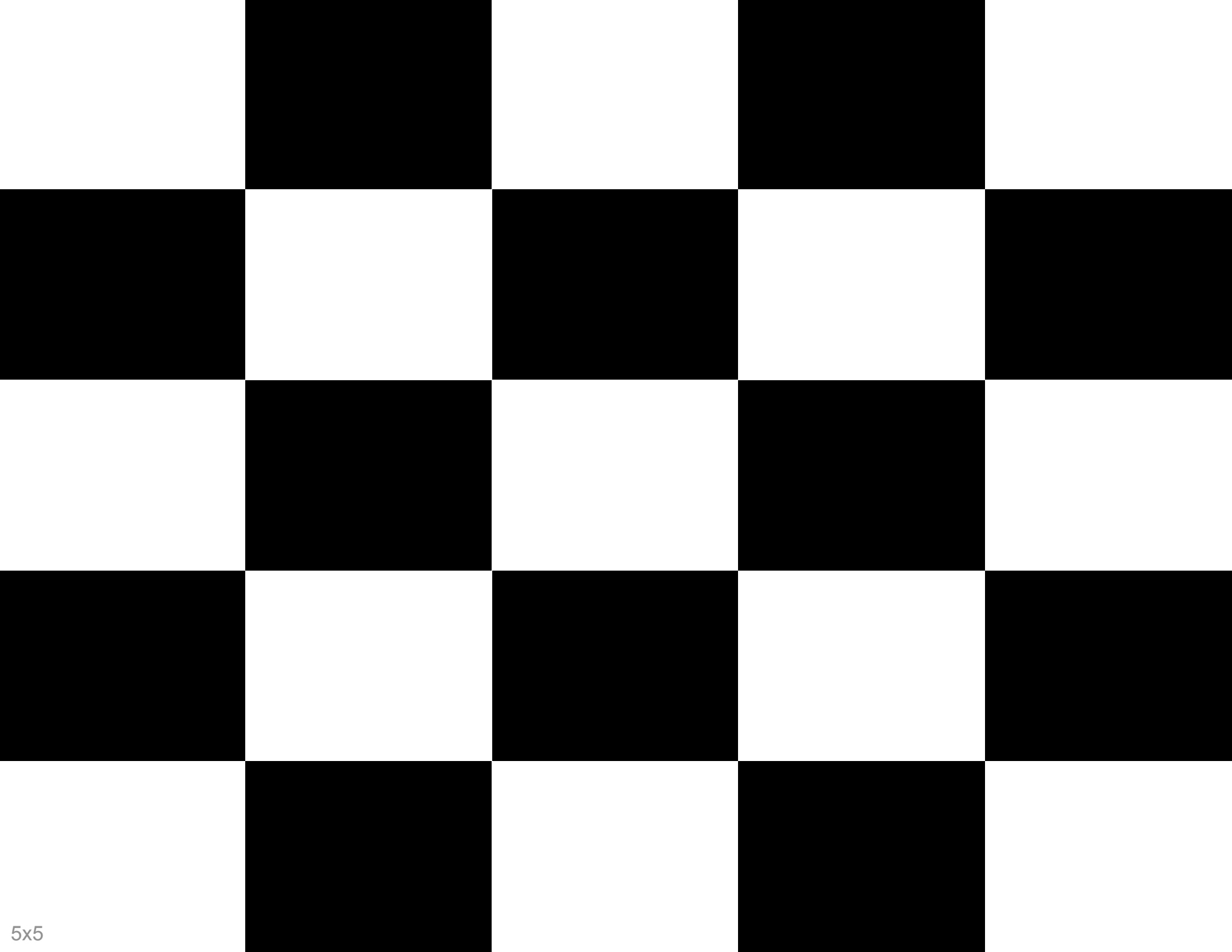

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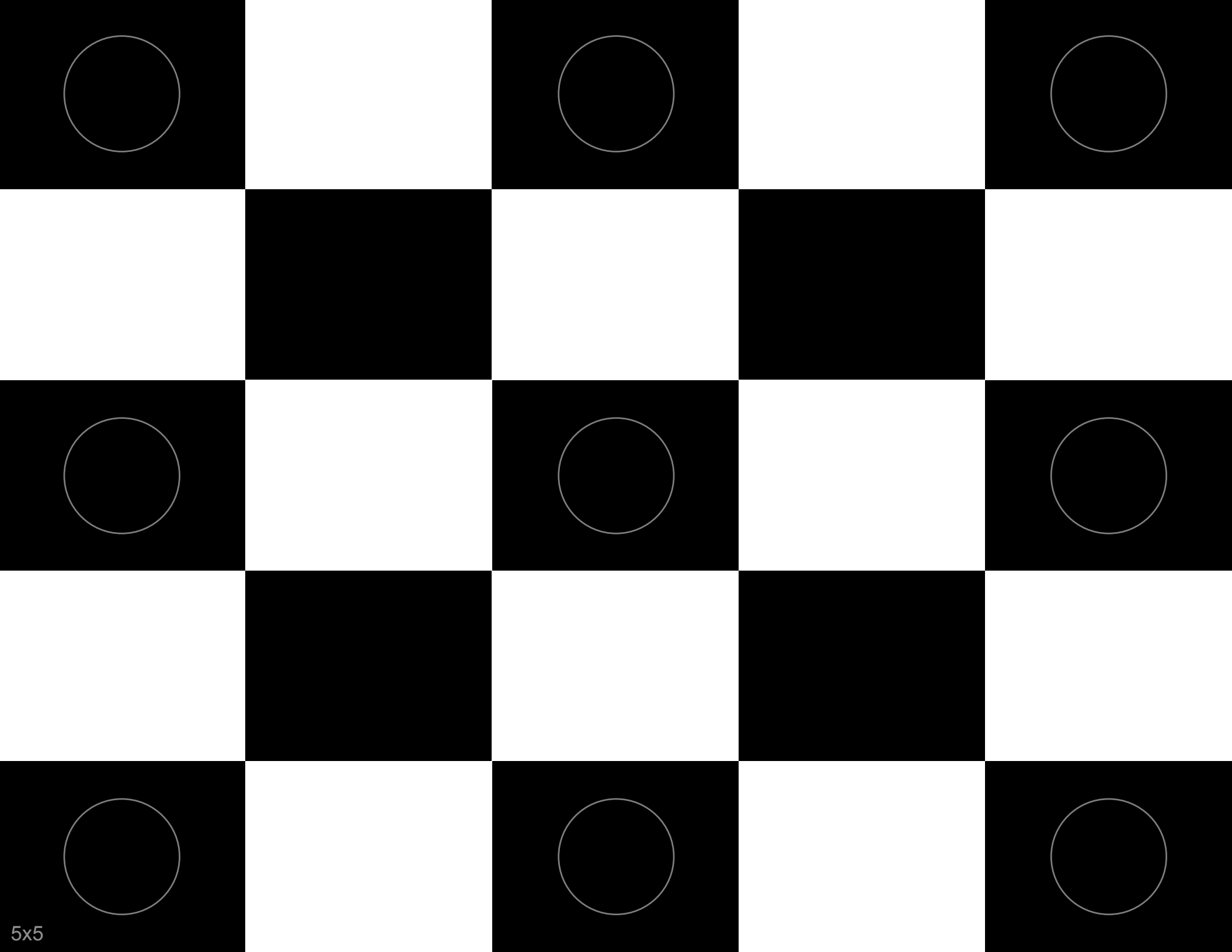
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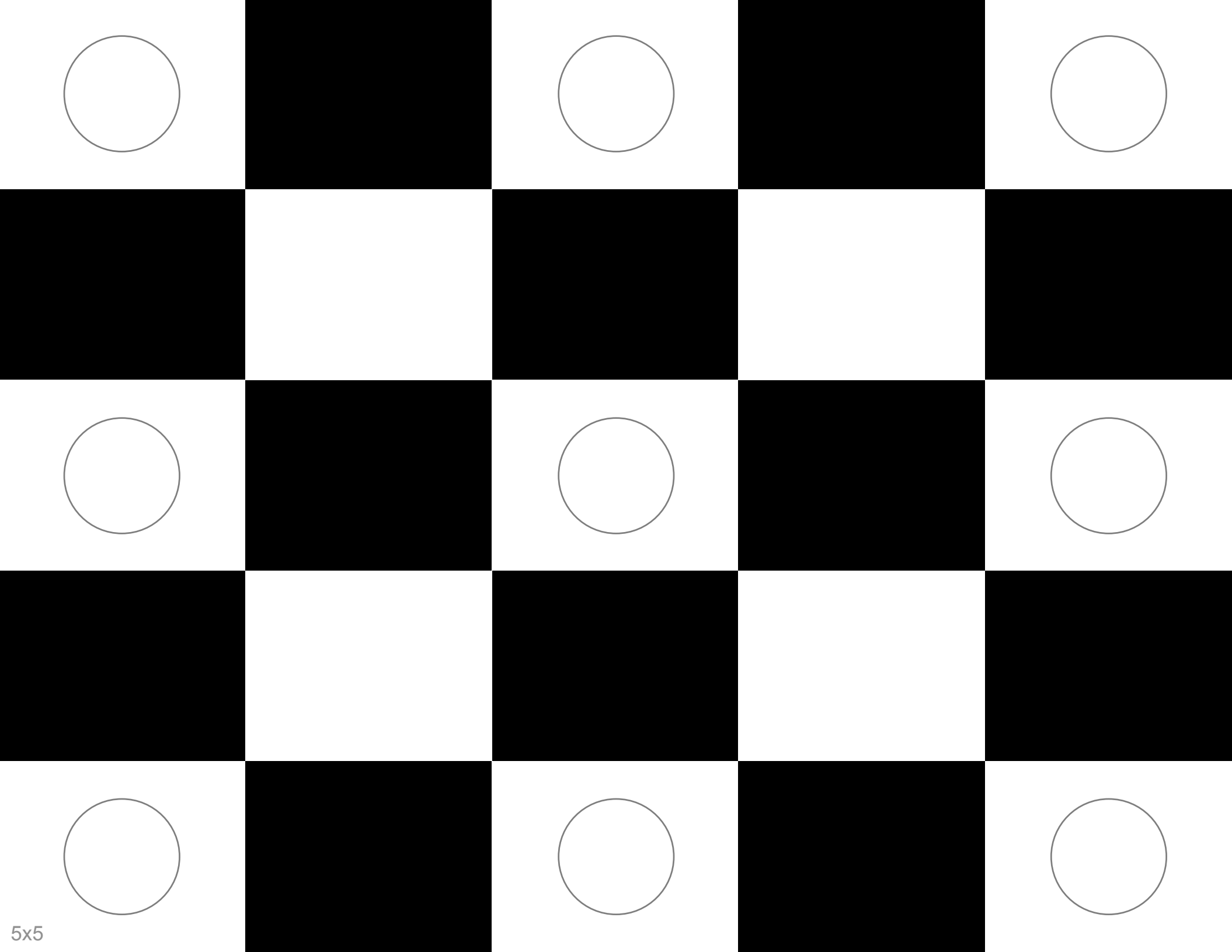
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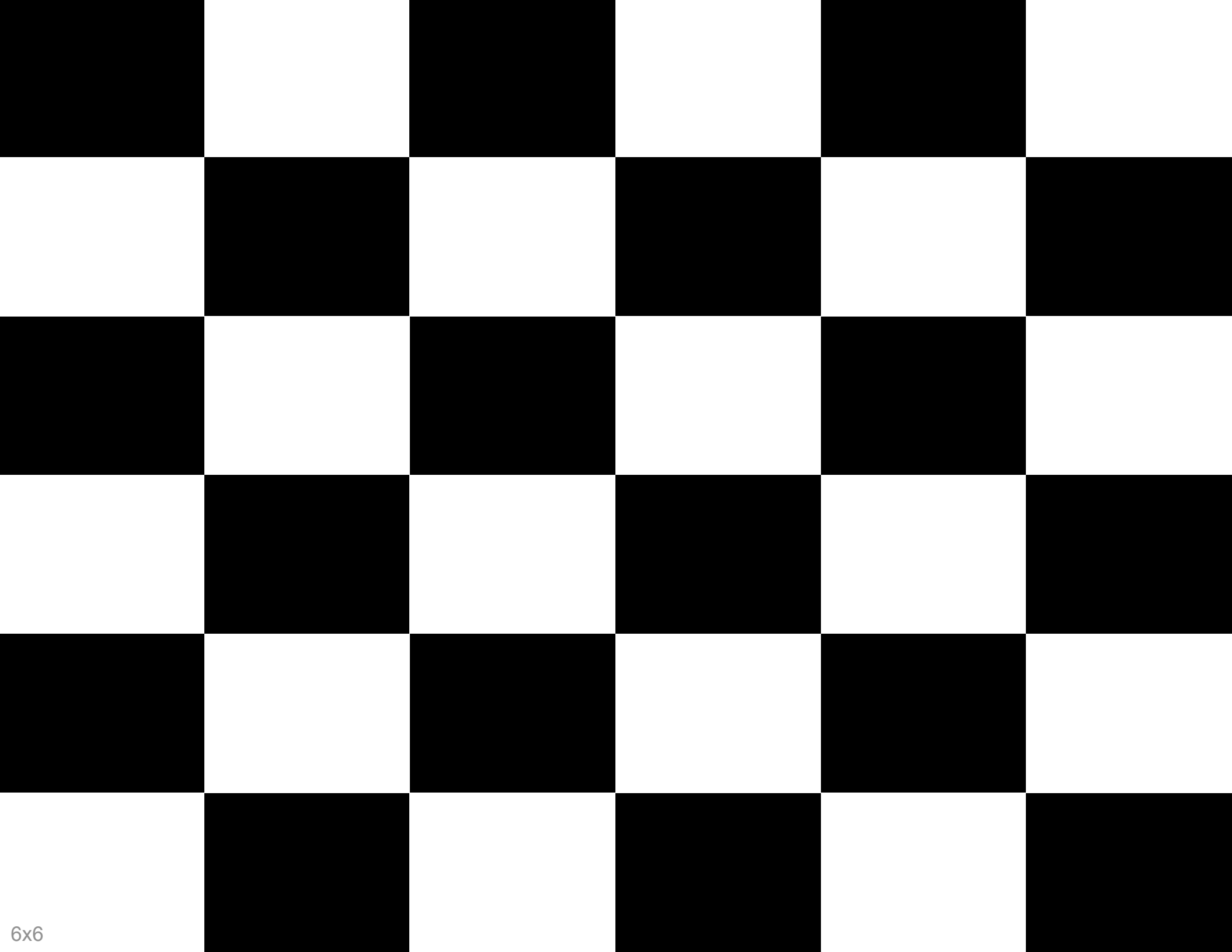
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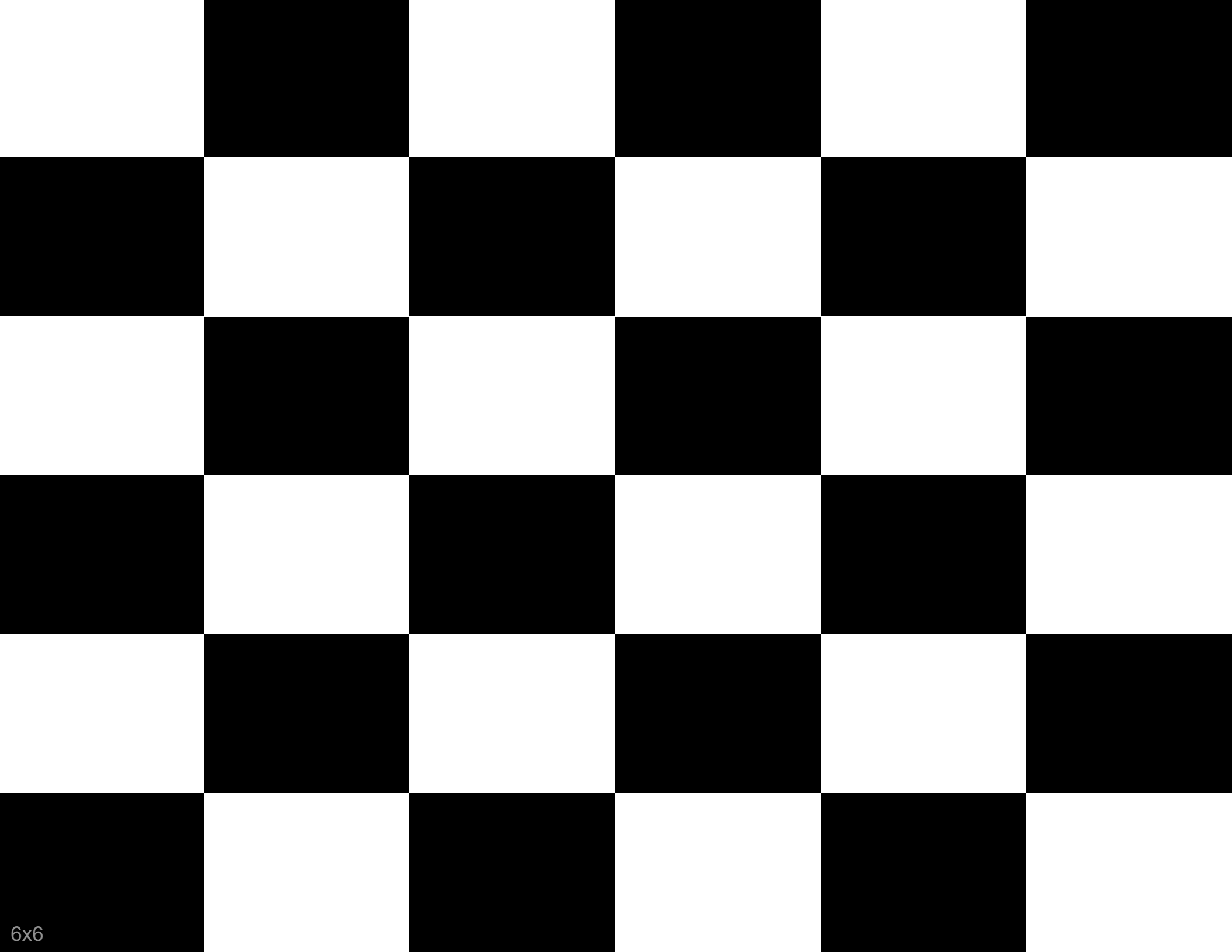
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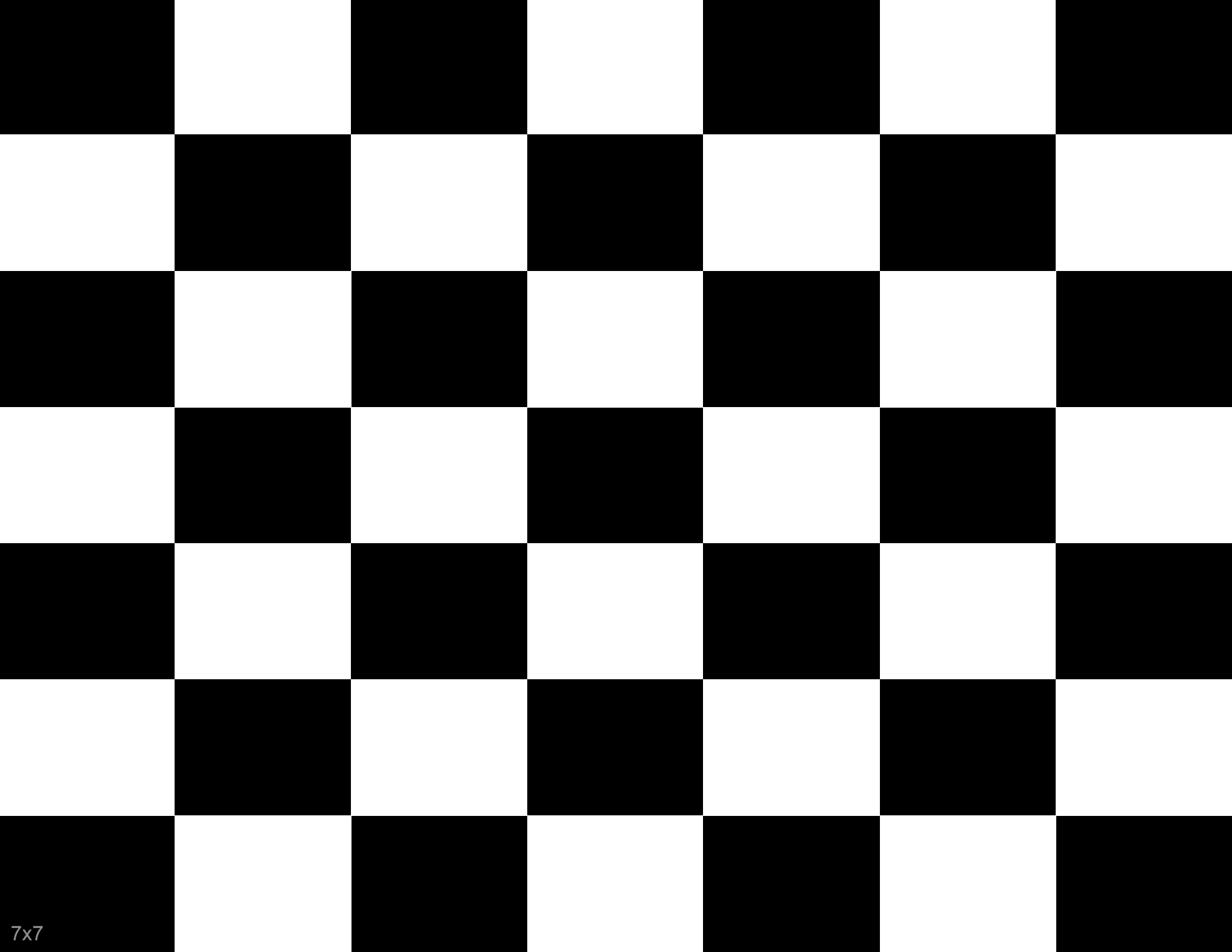
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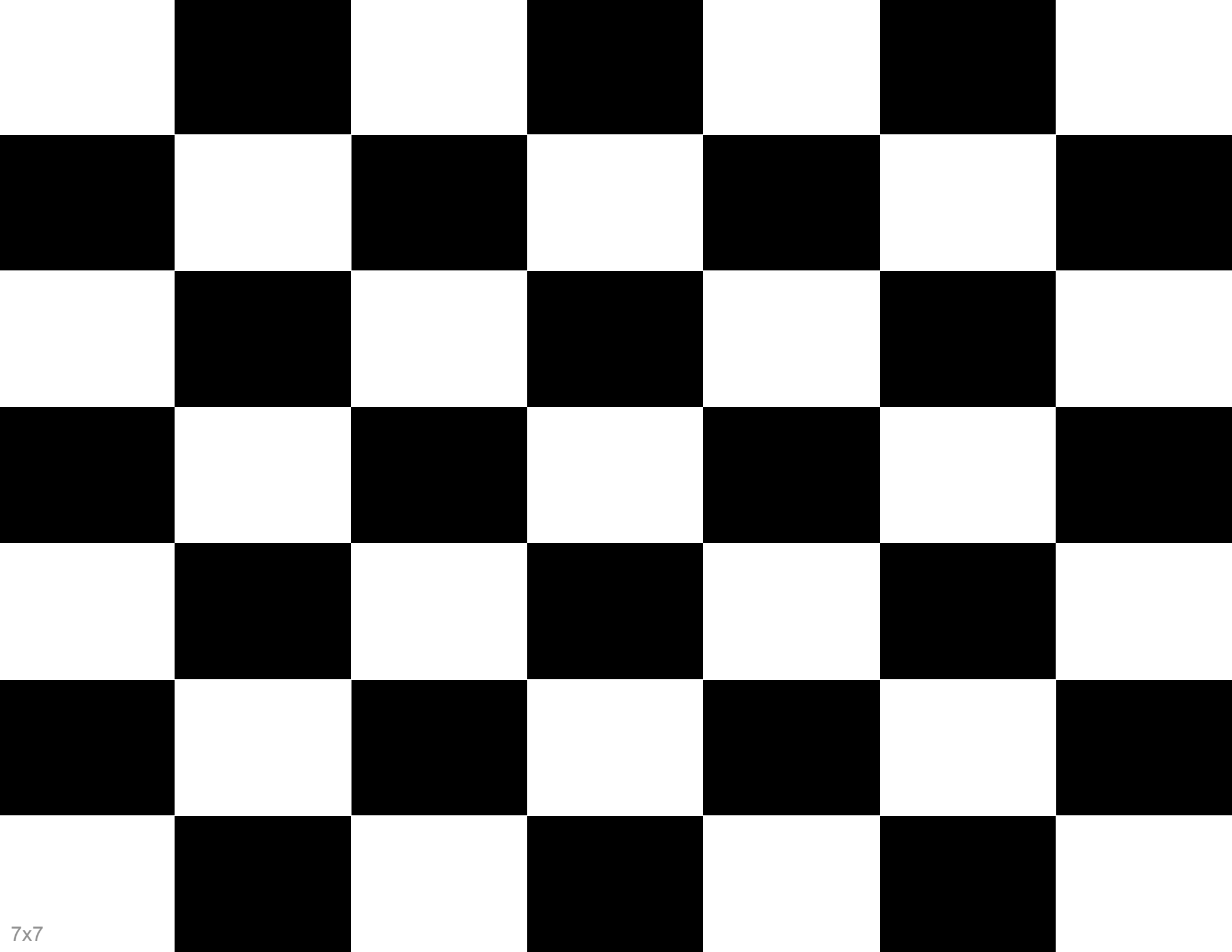
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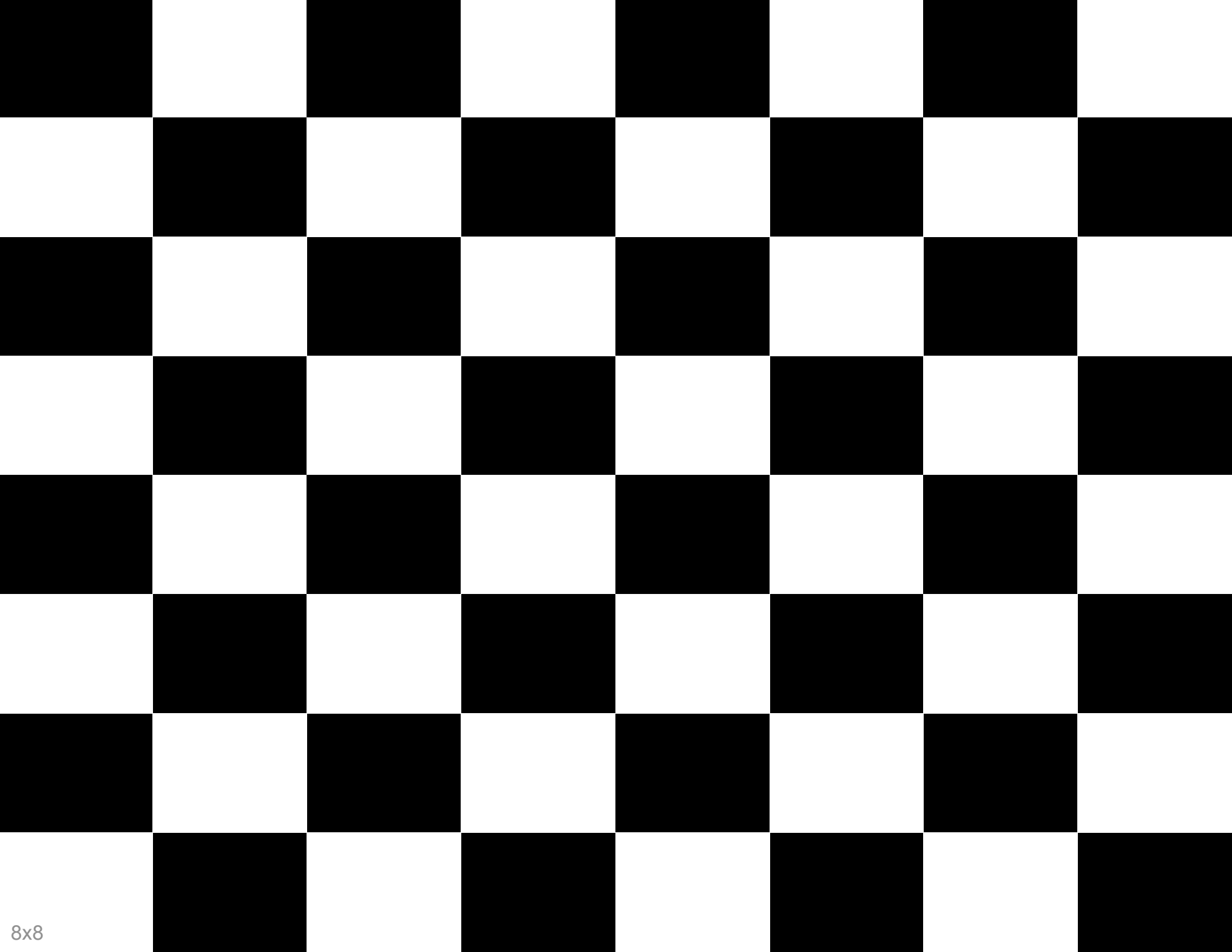
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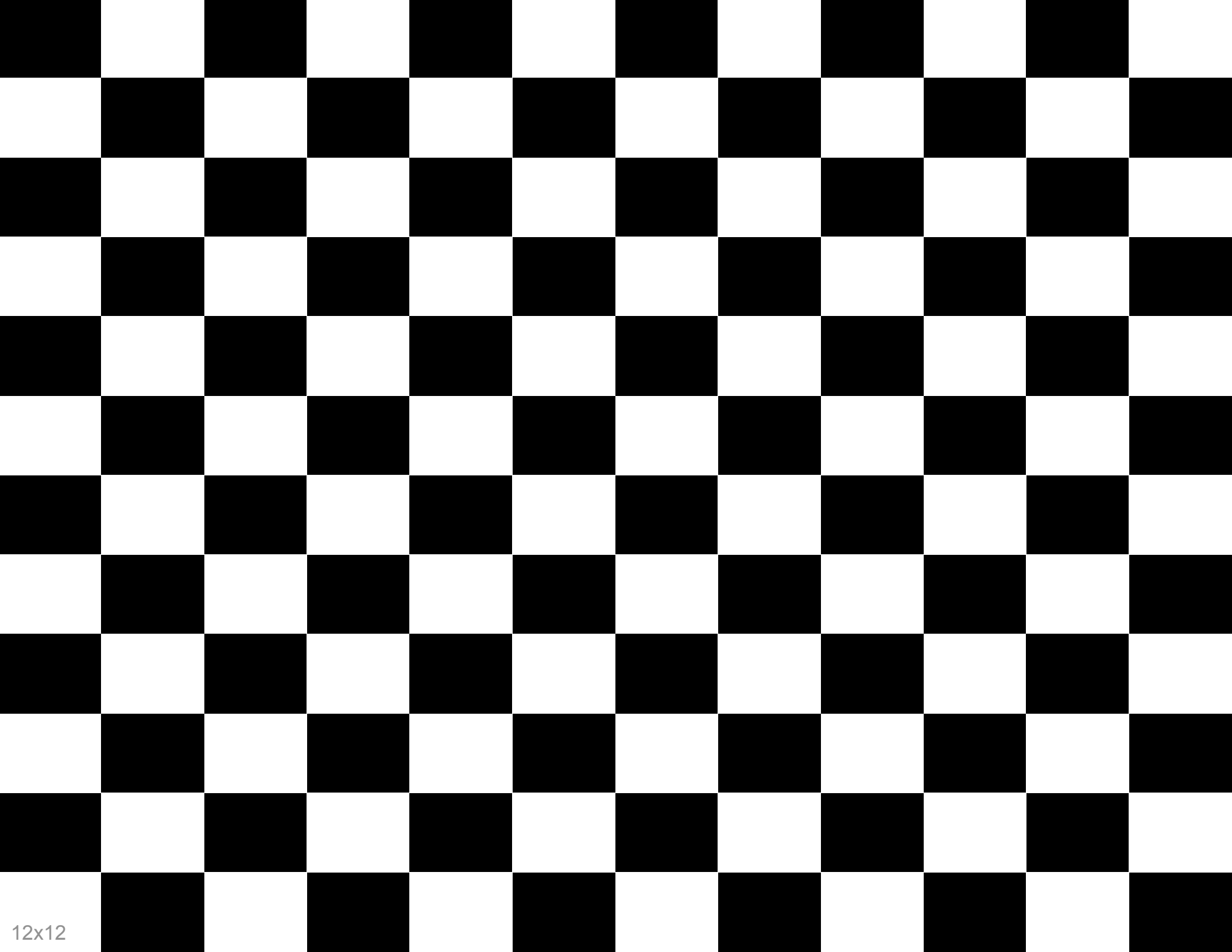
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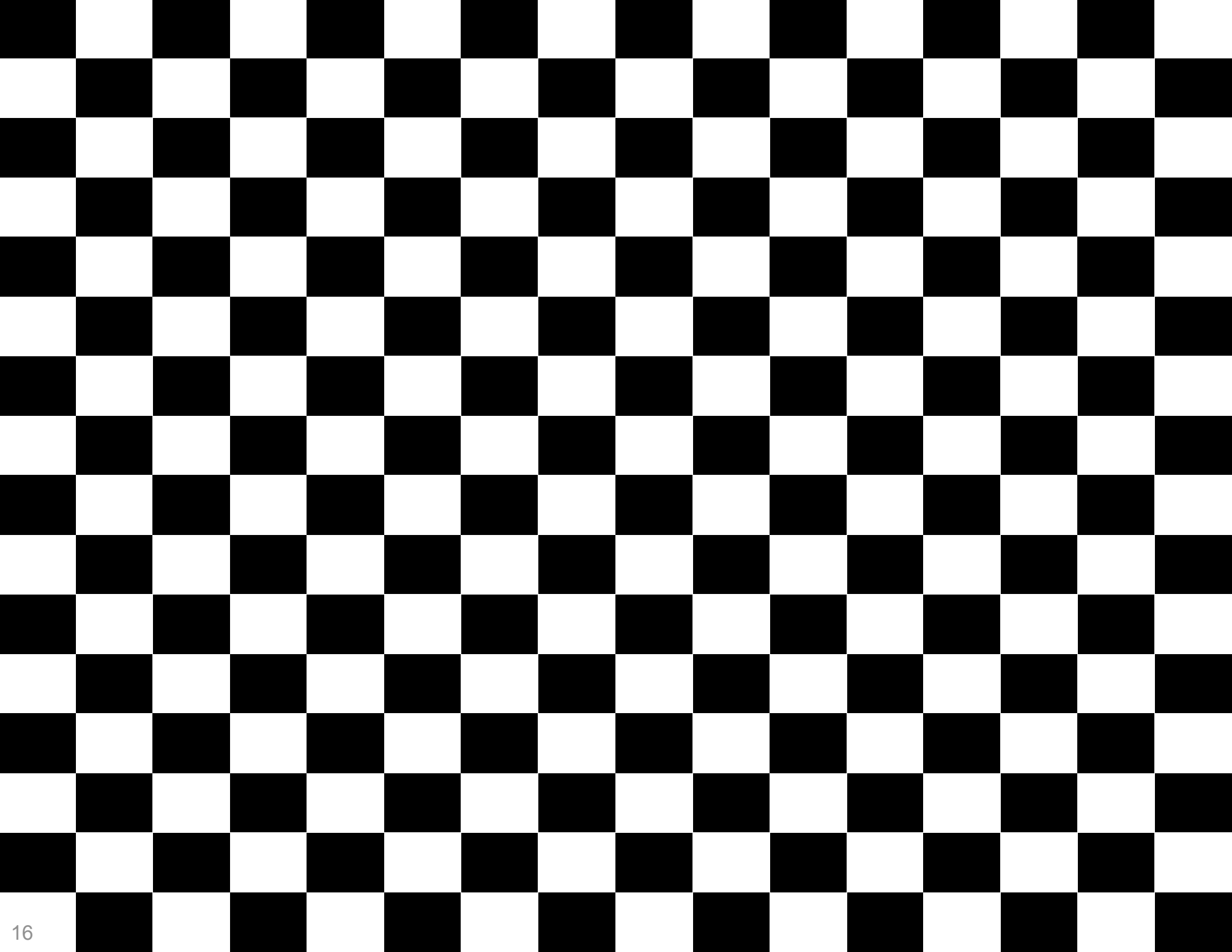
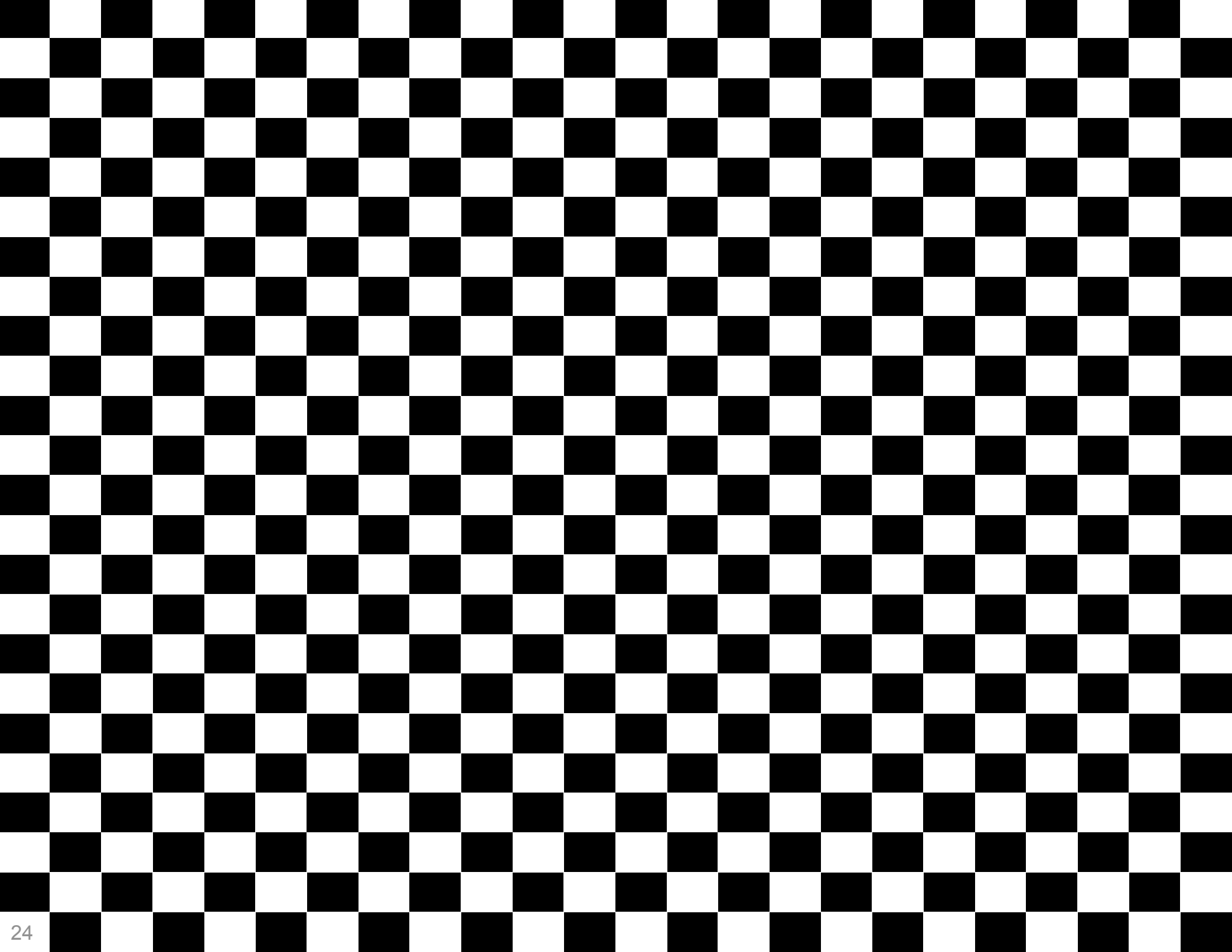
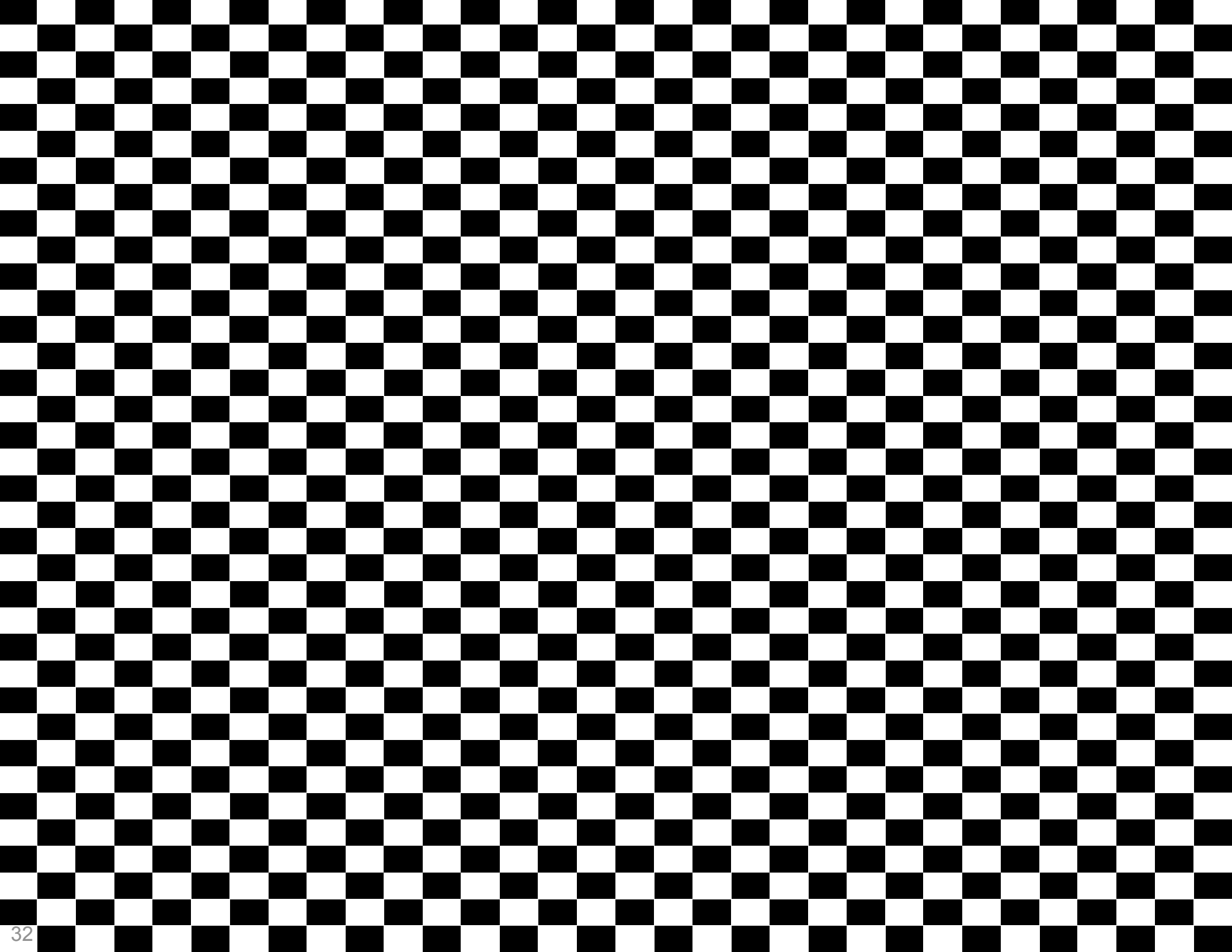
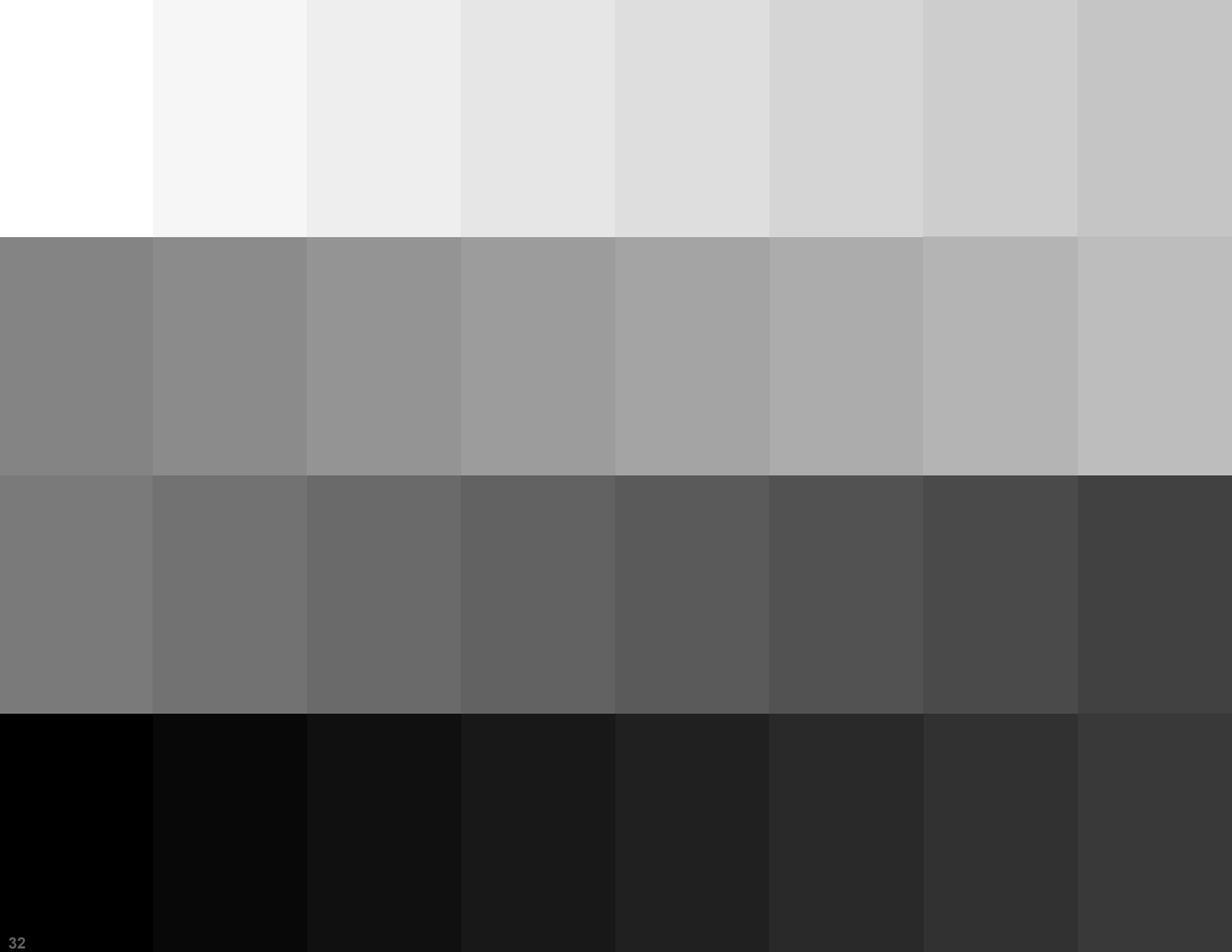
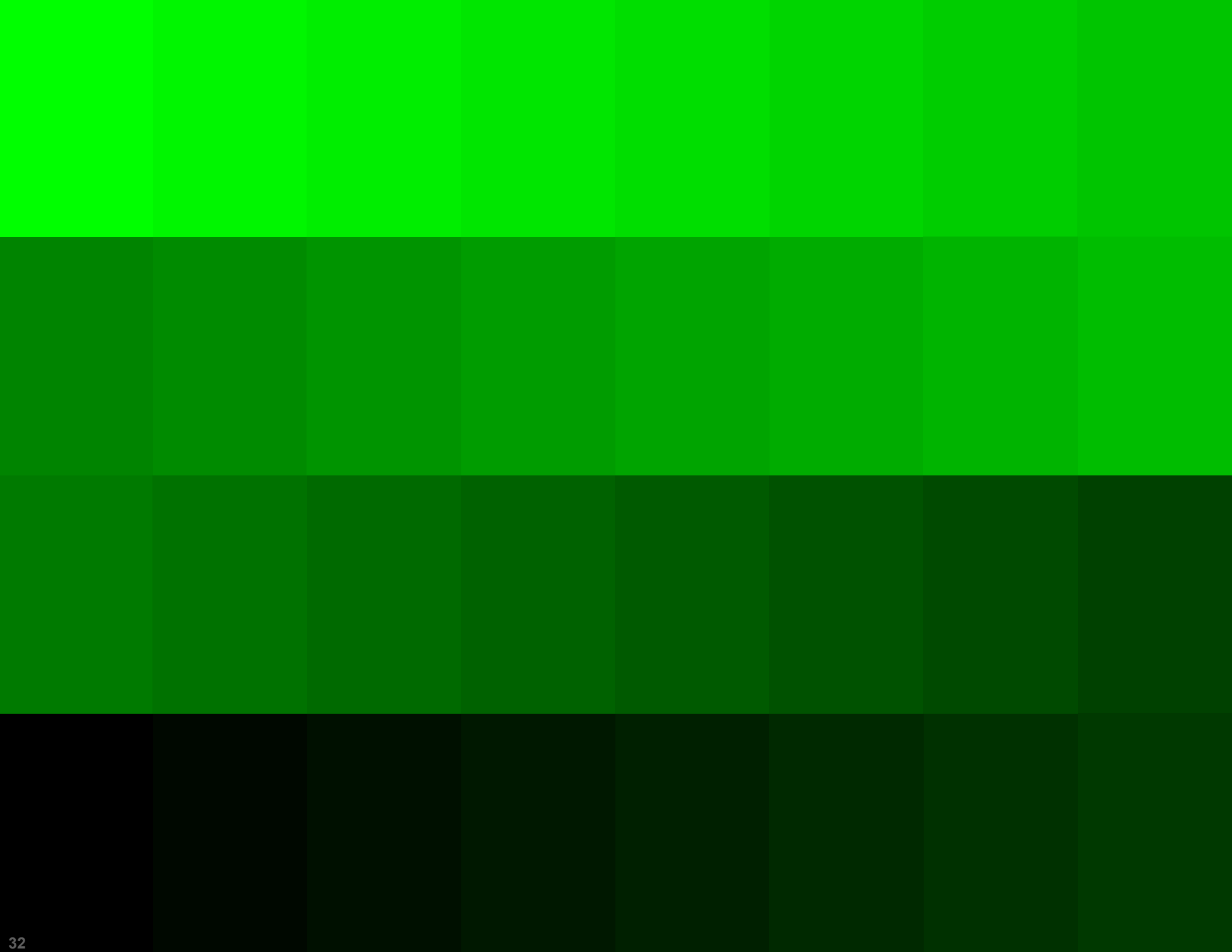


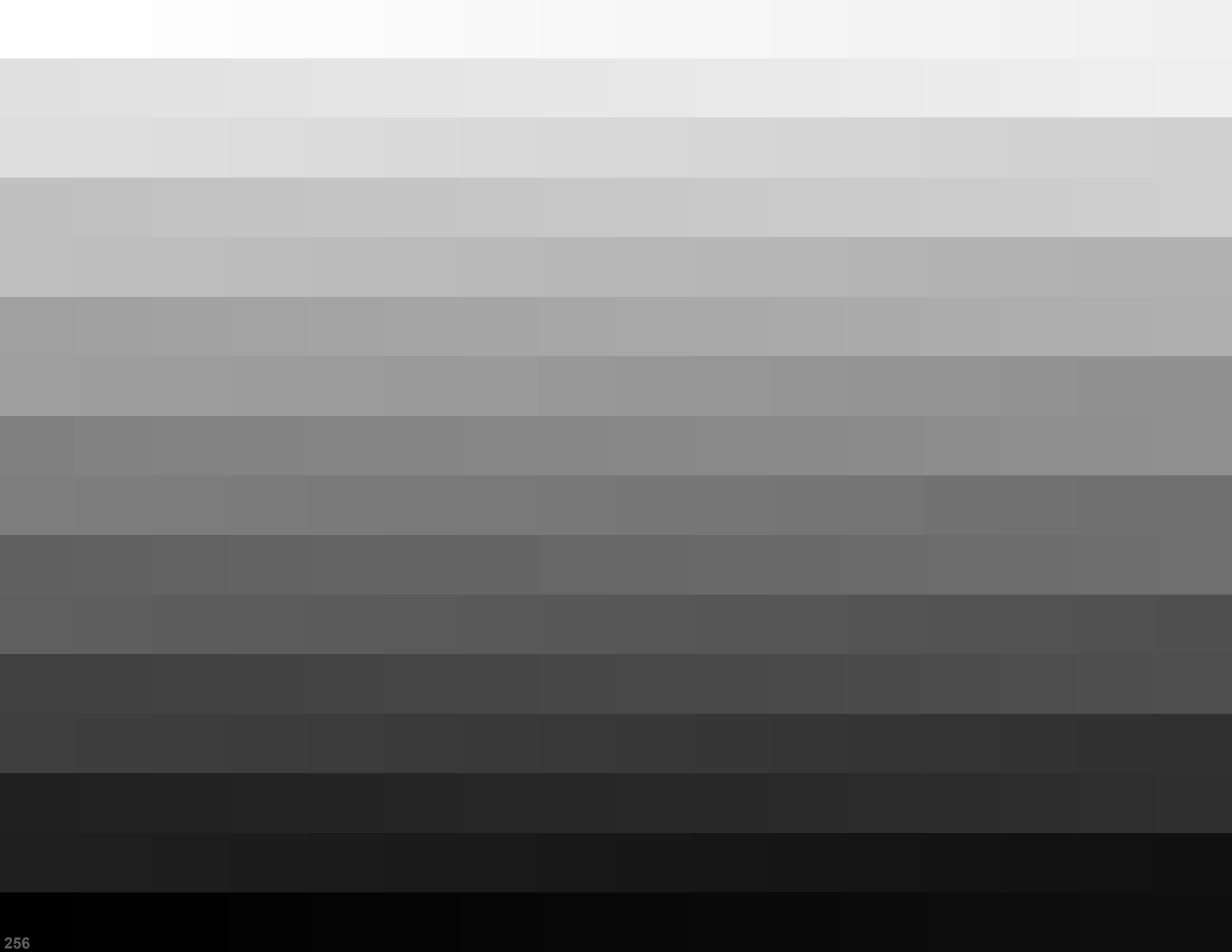









128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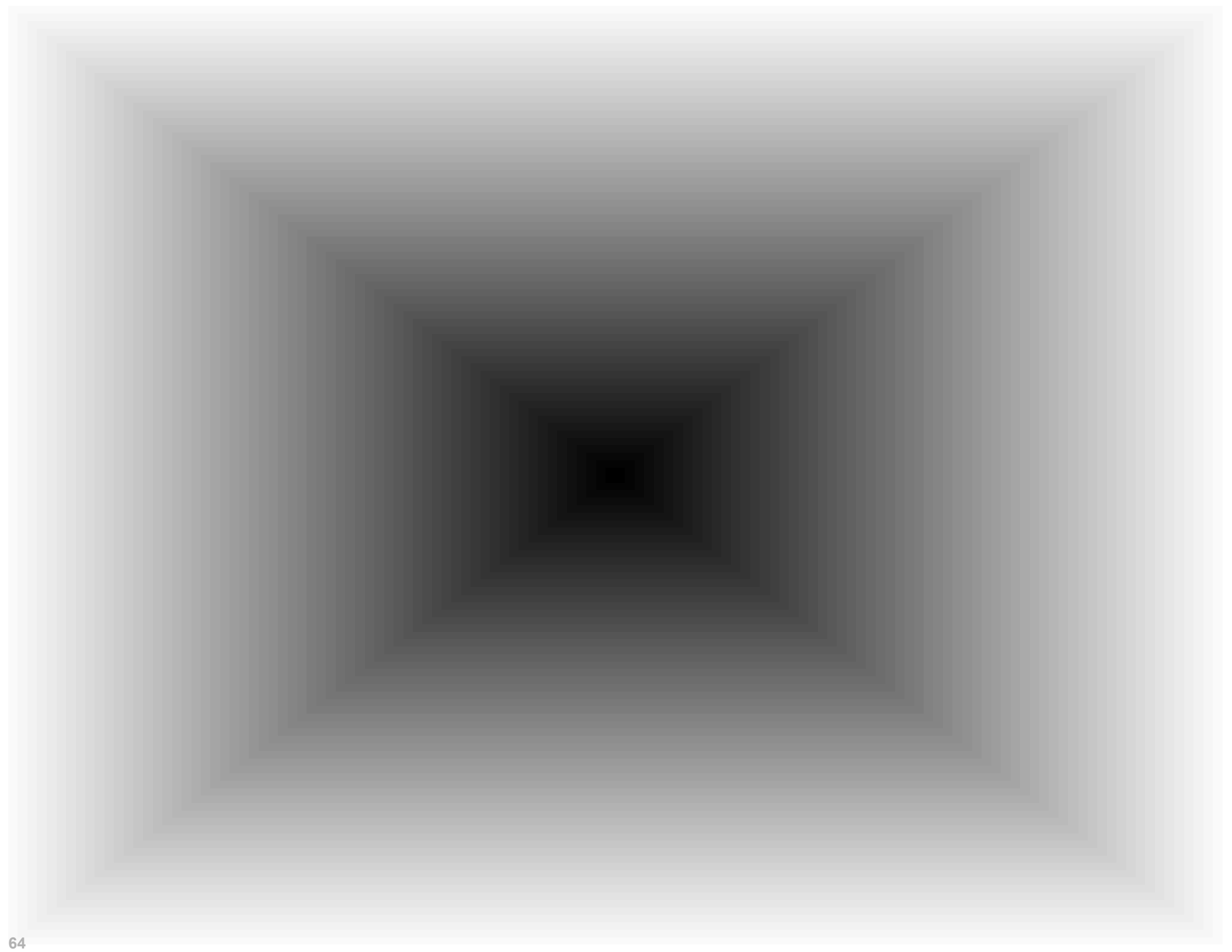
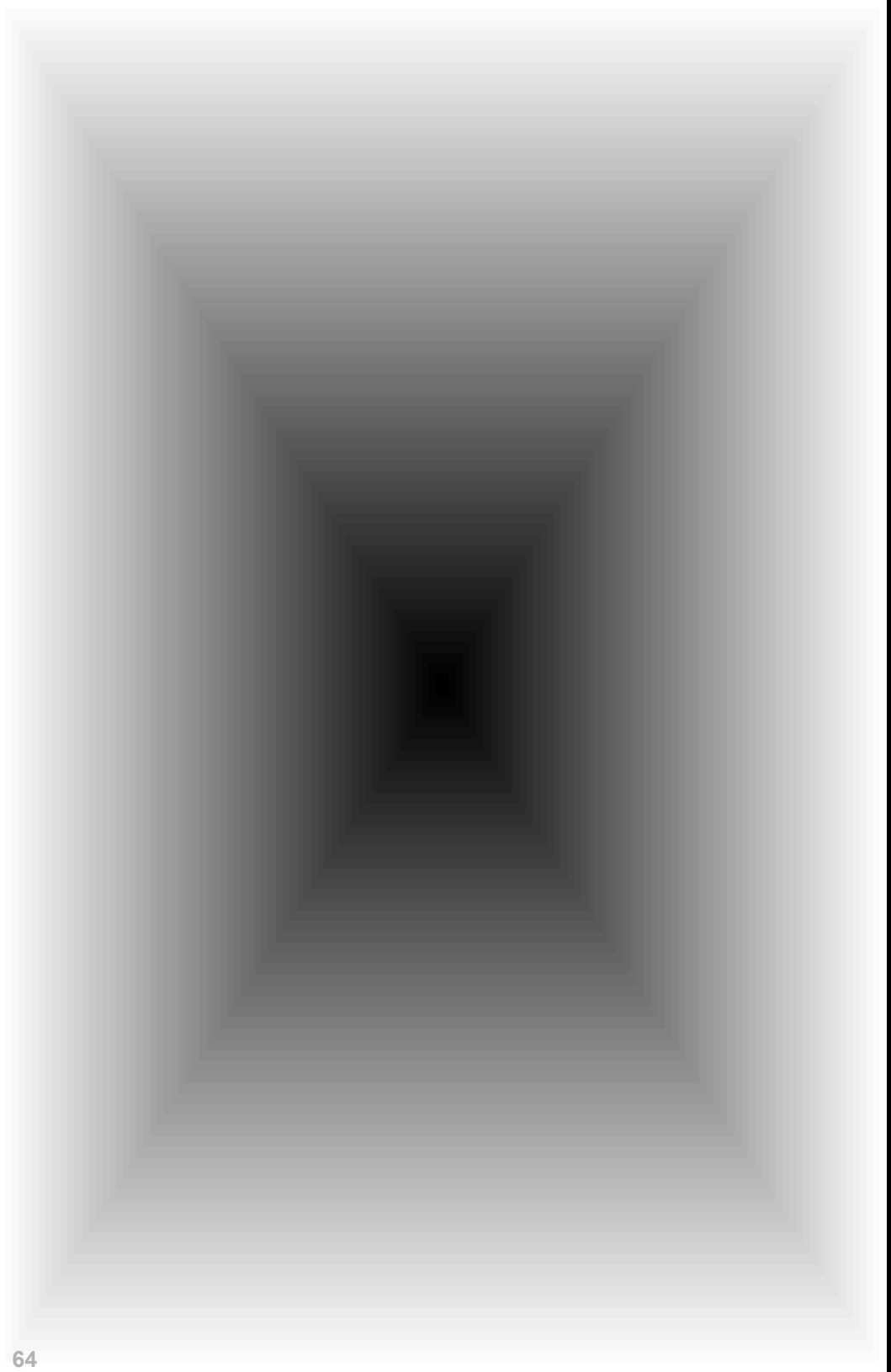
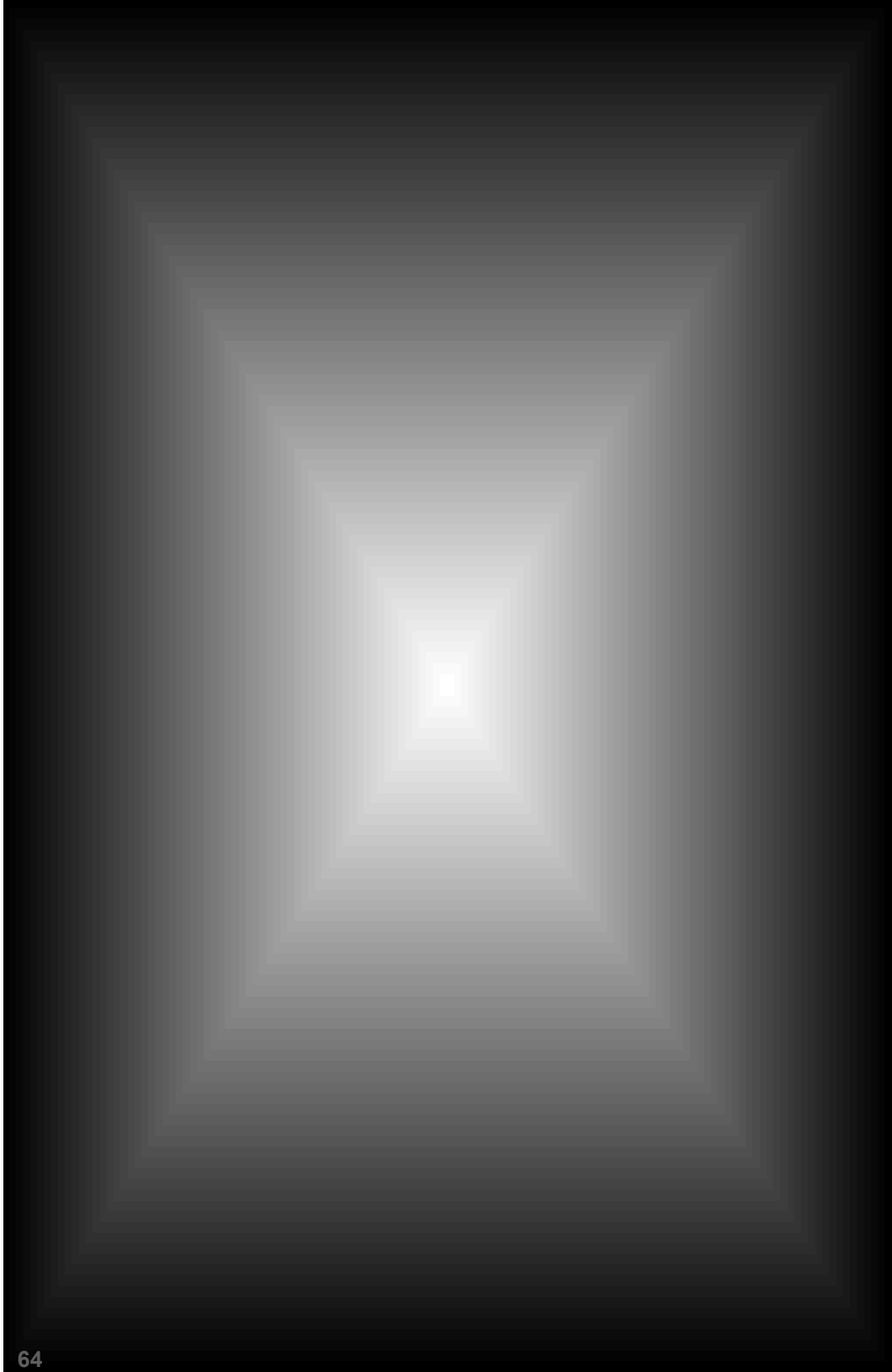
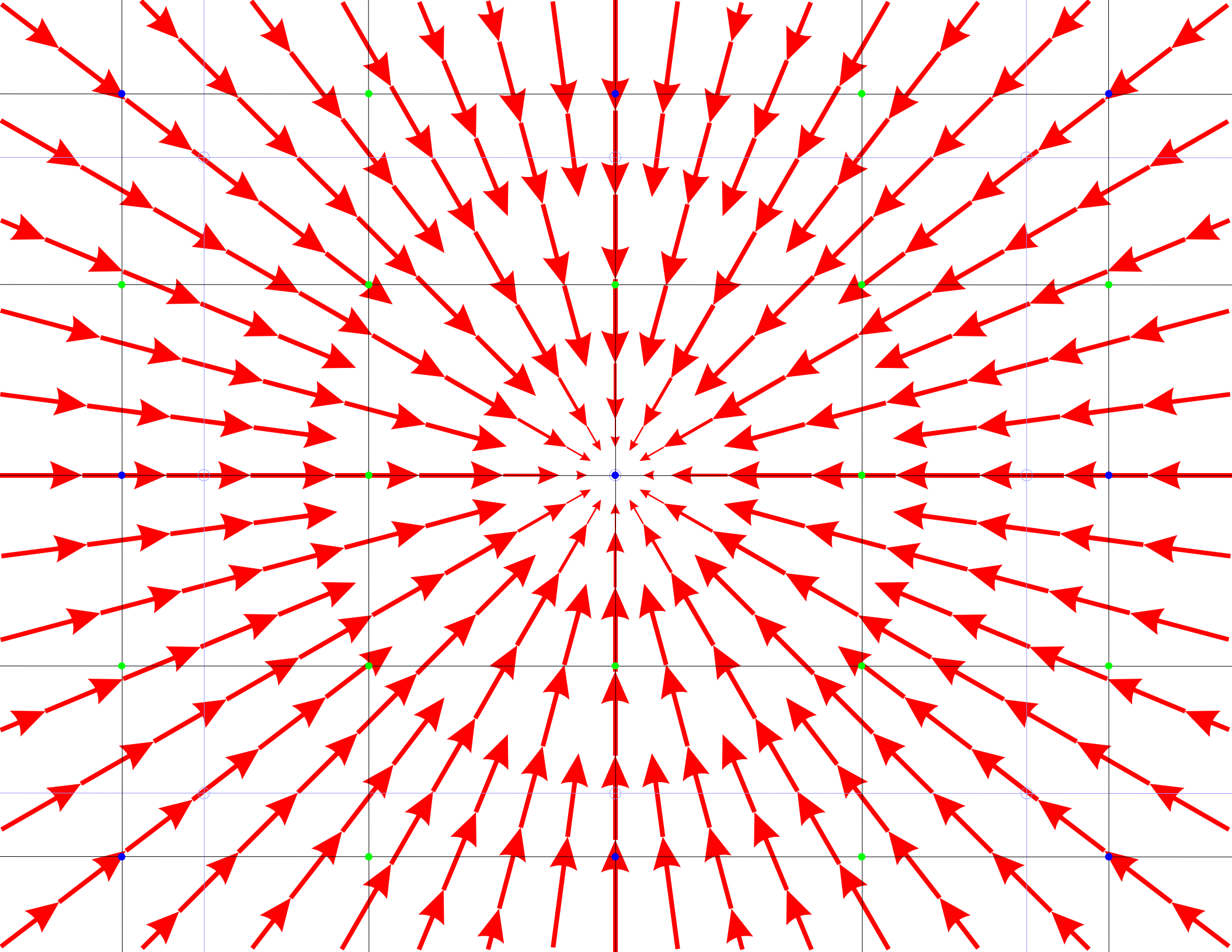
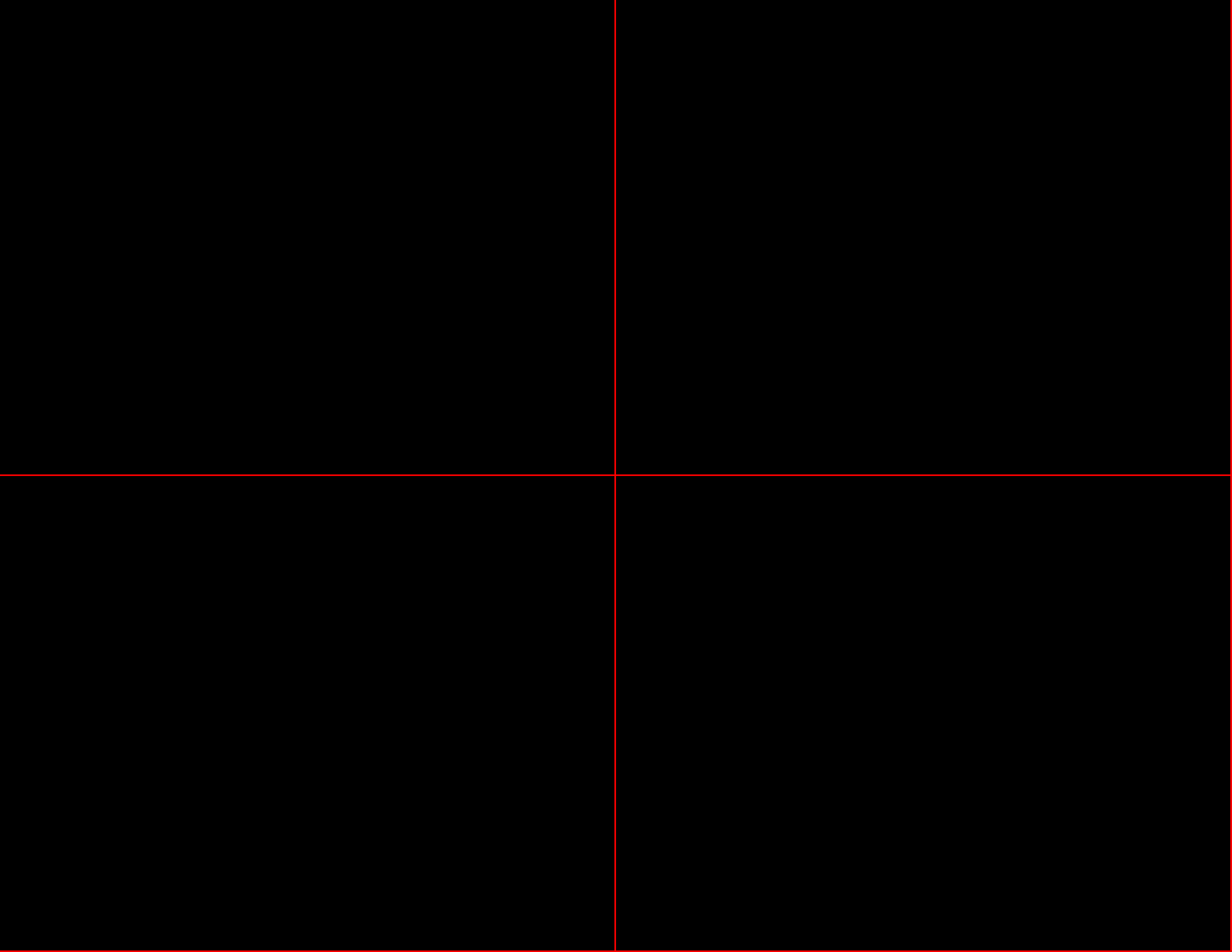




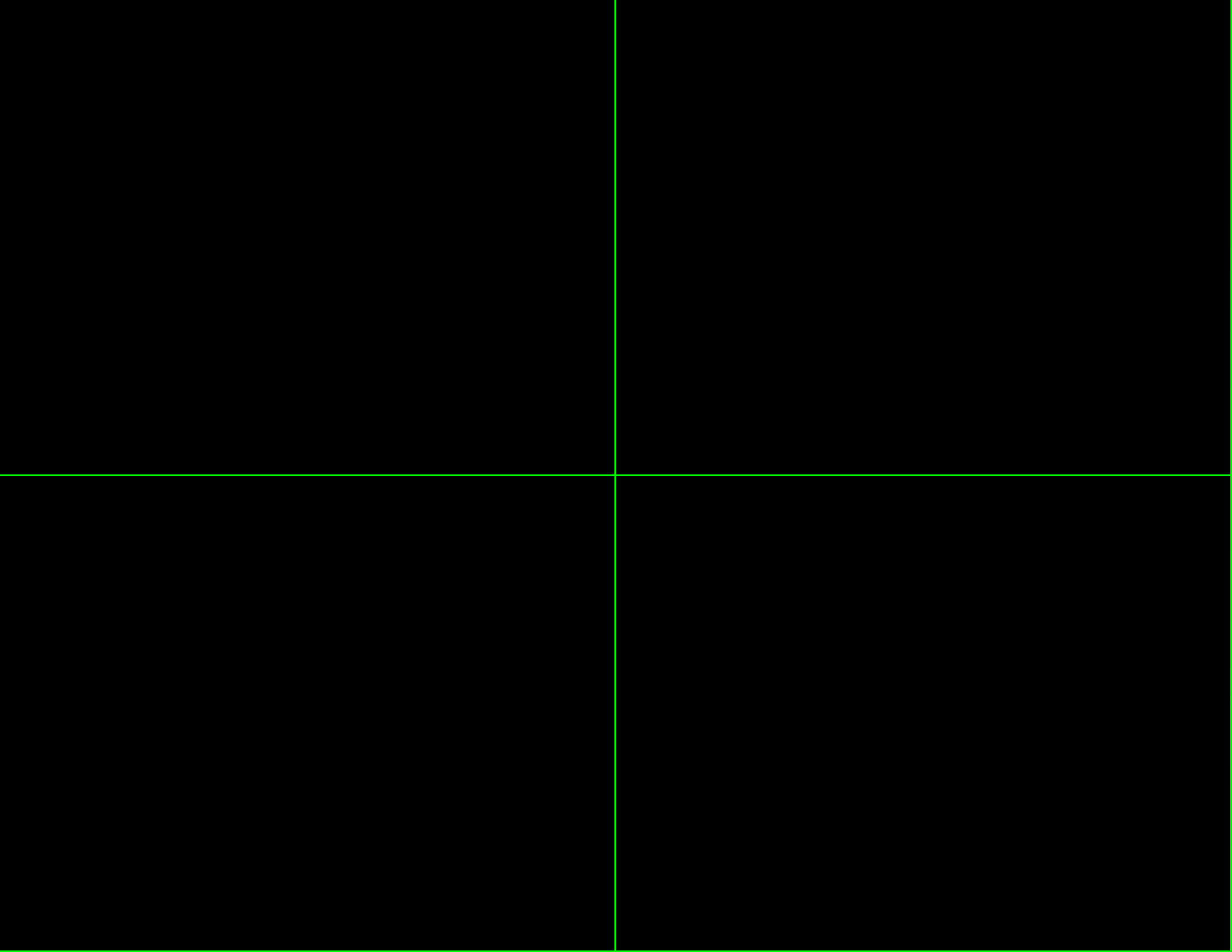




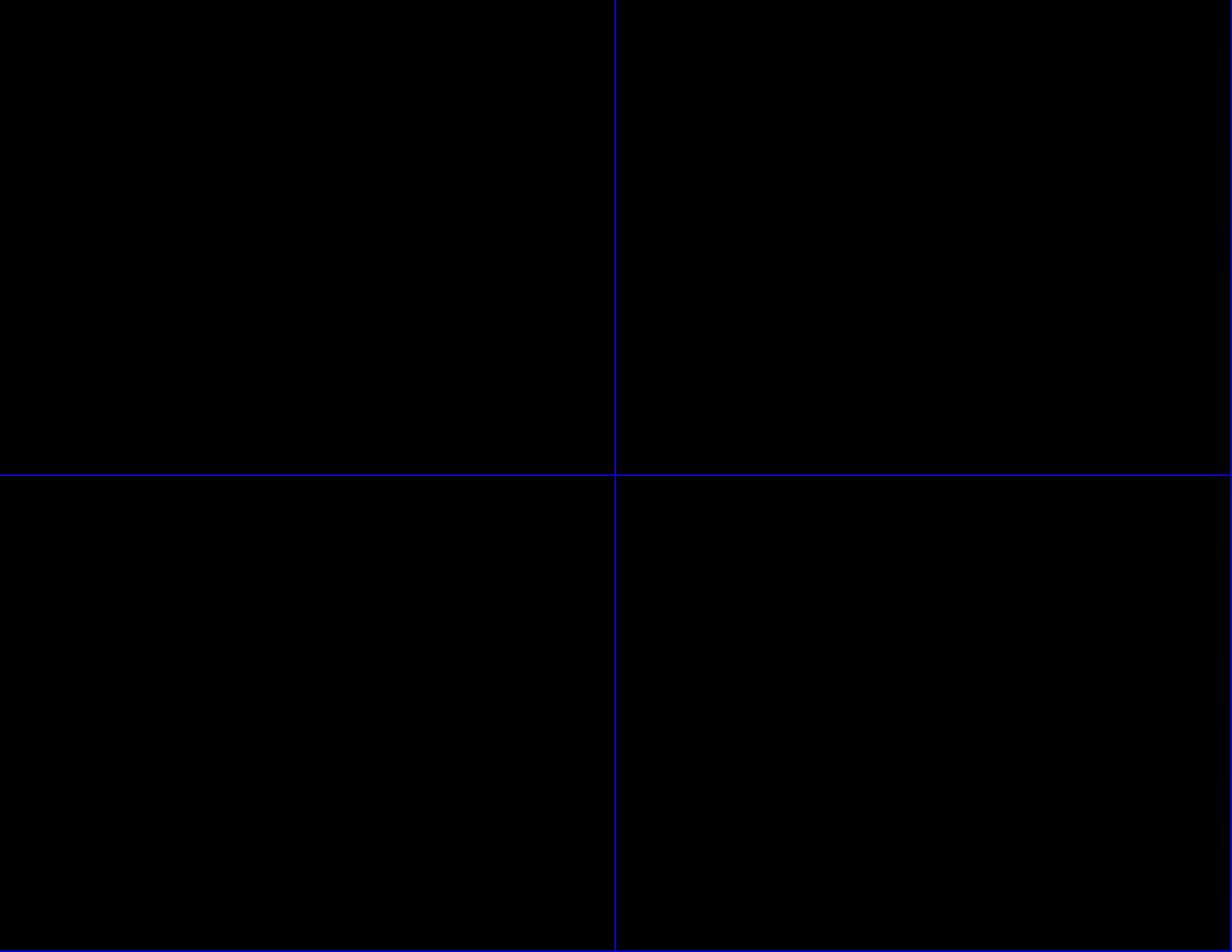


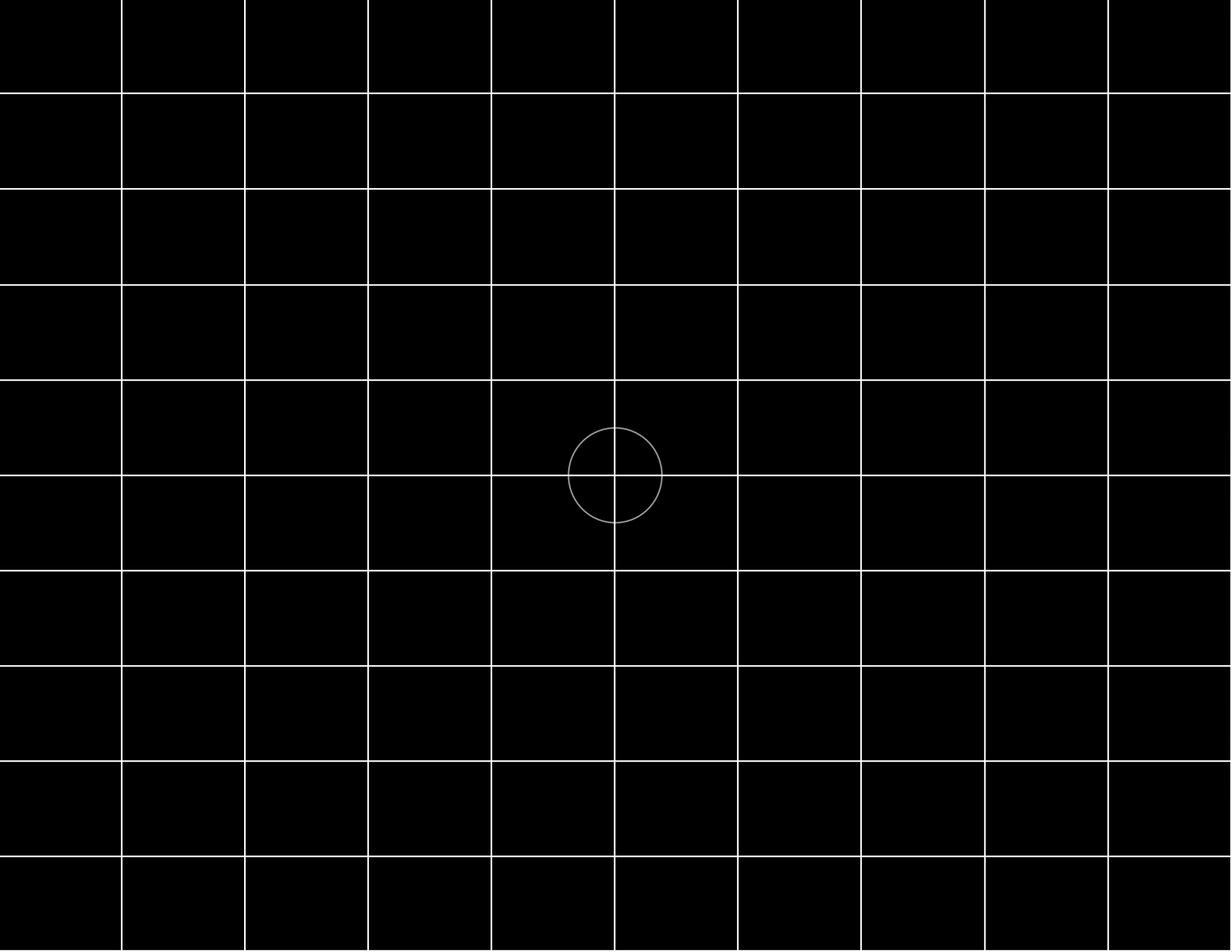



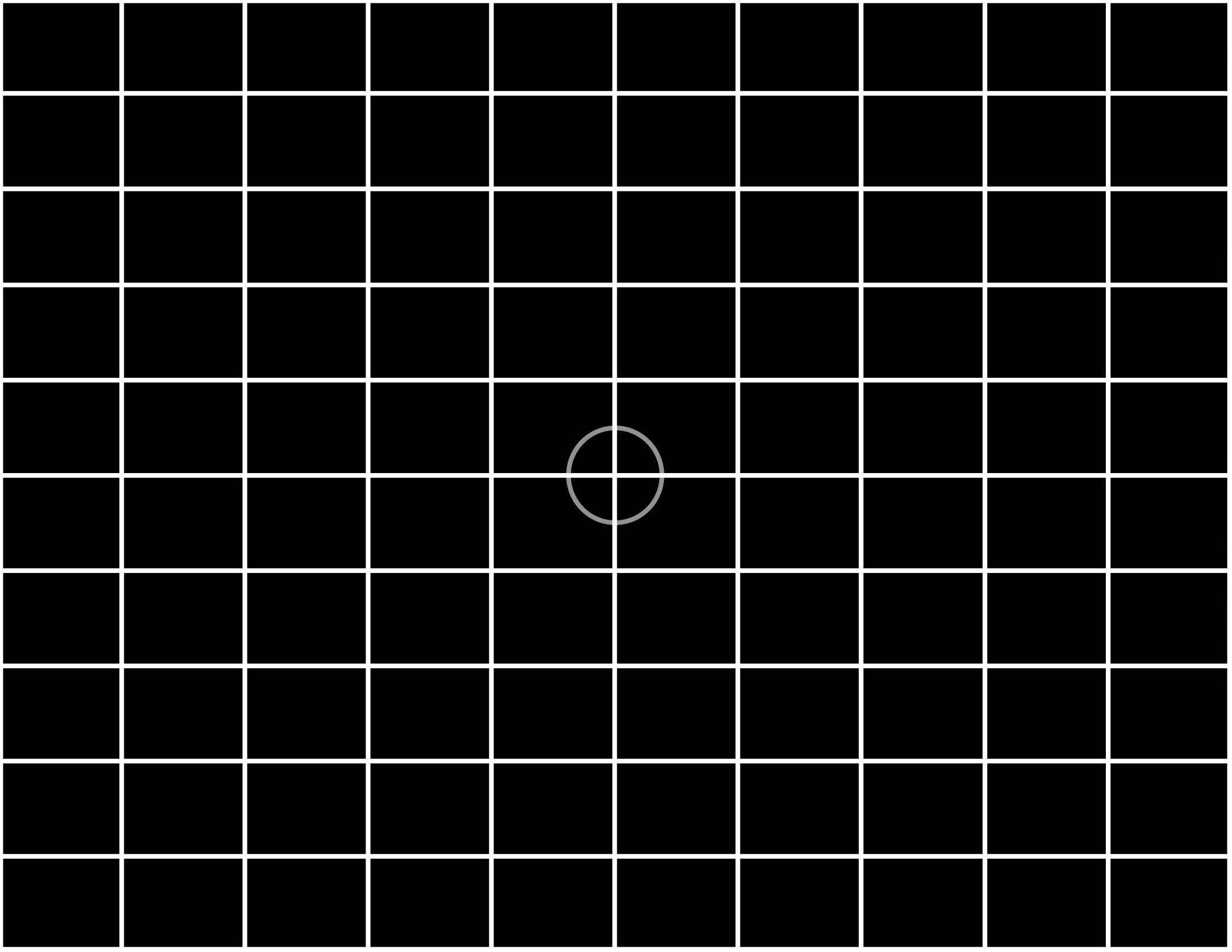


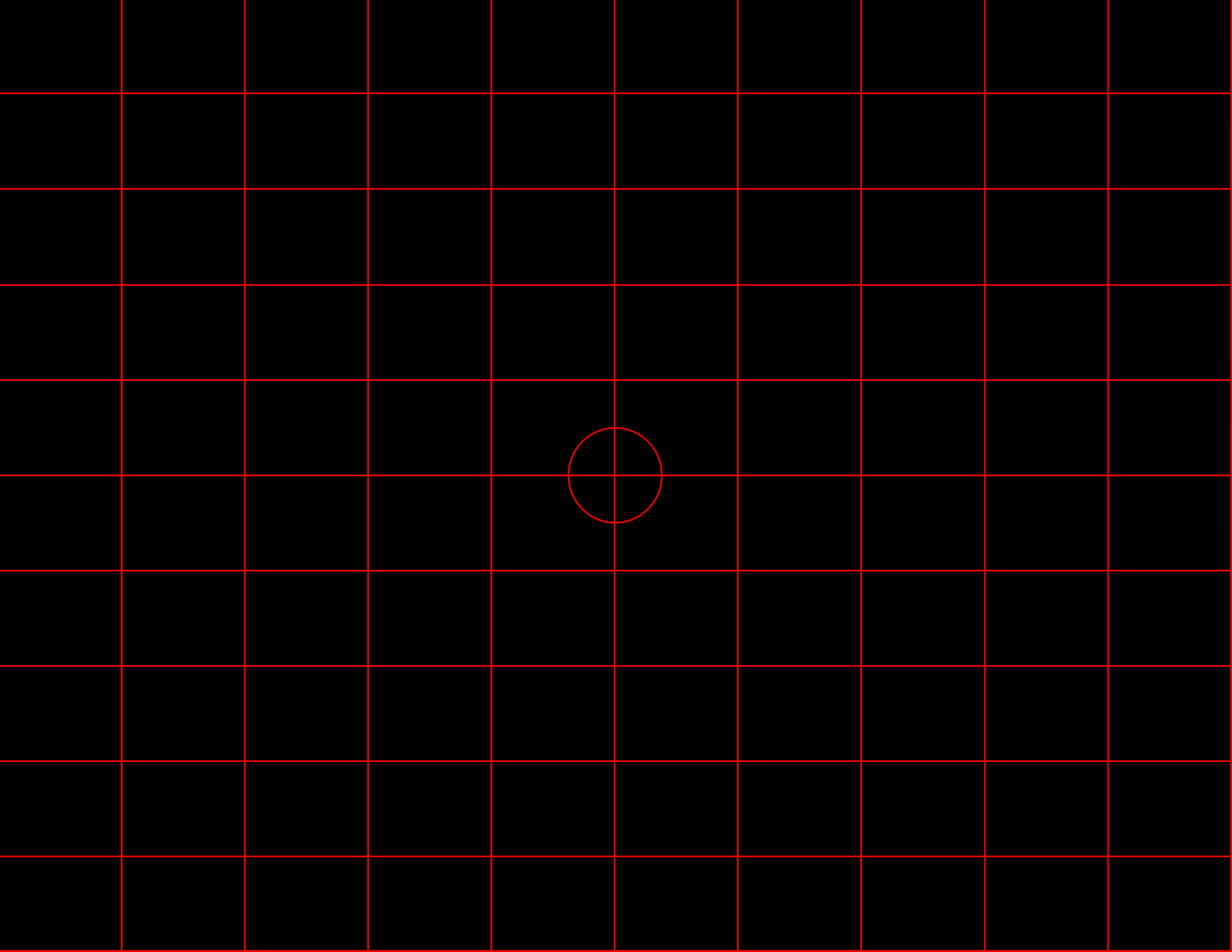



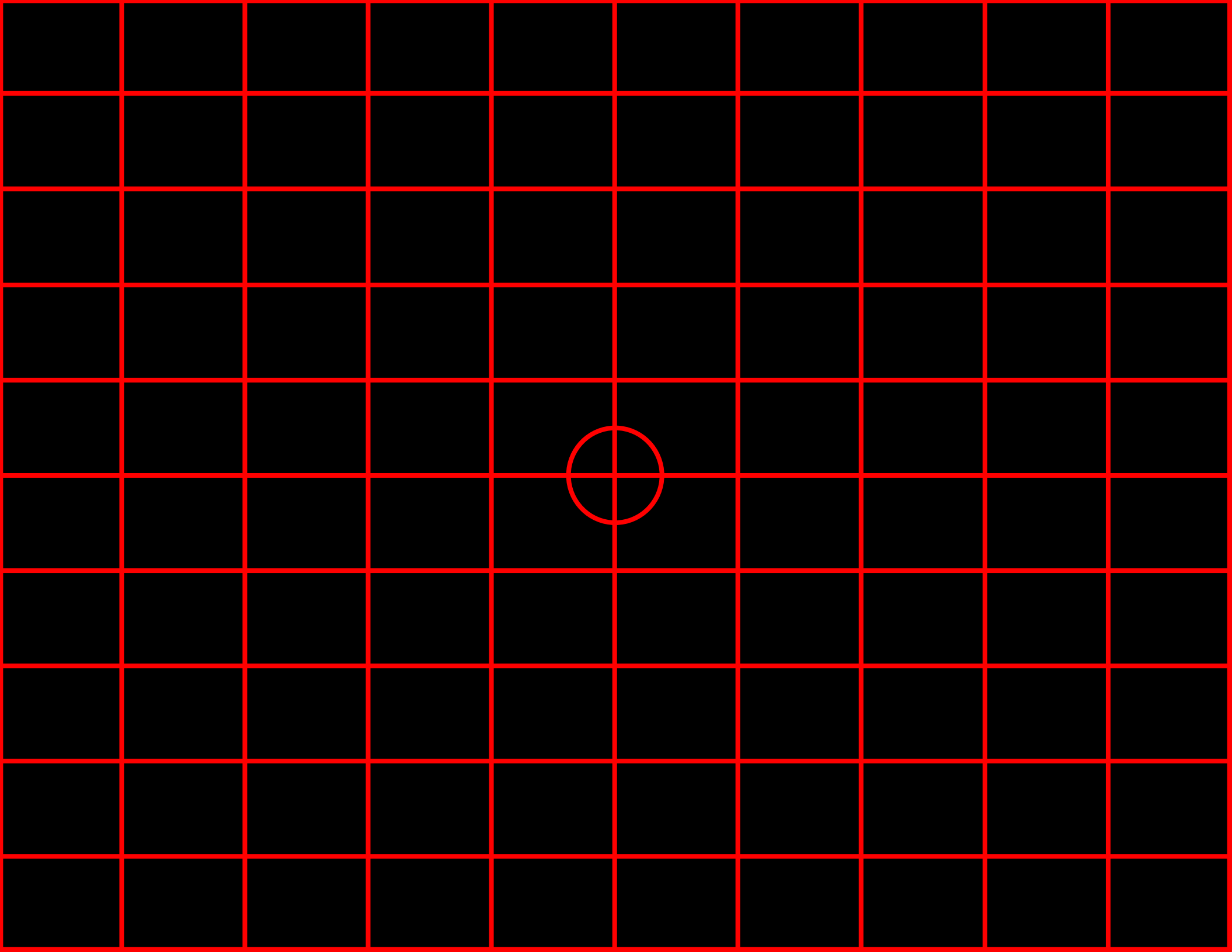


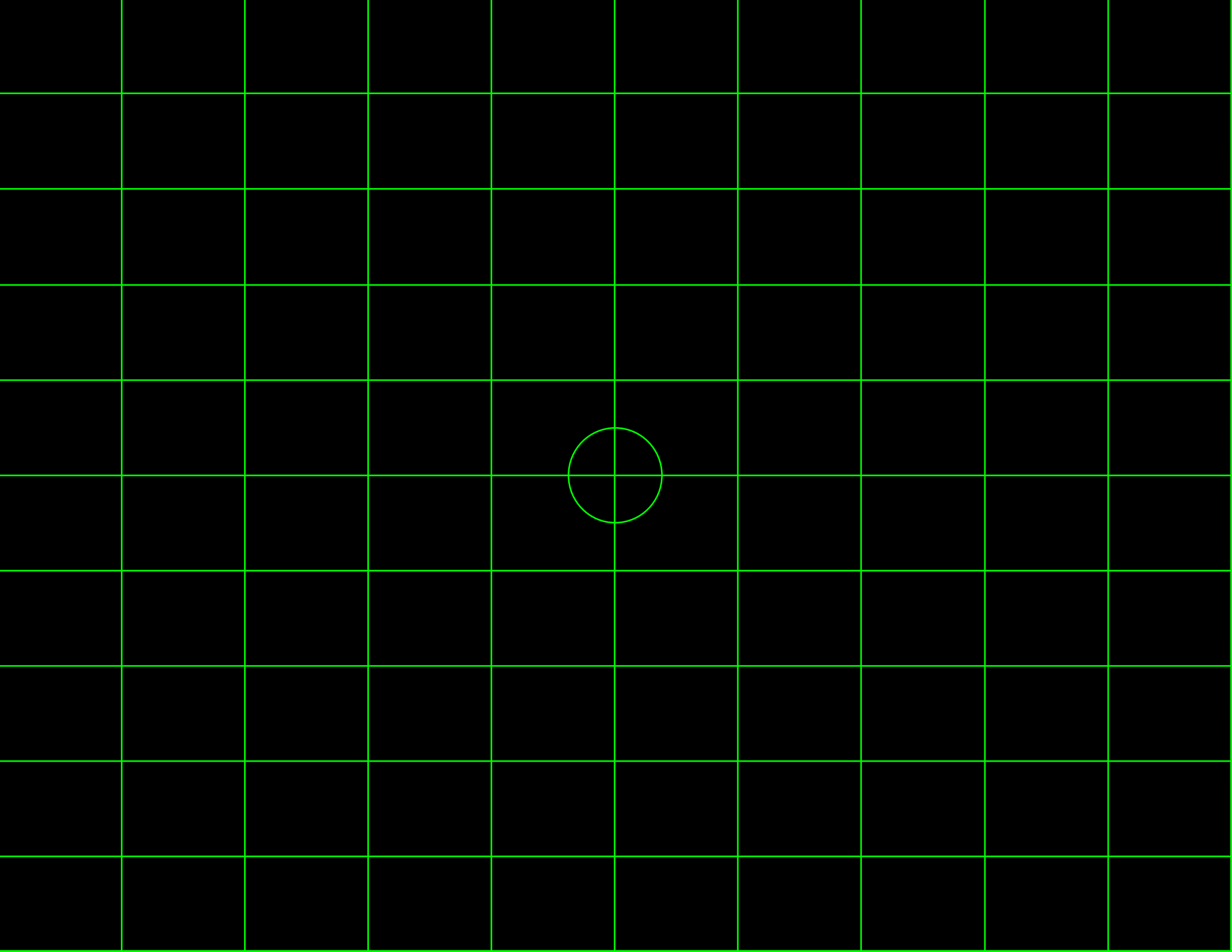



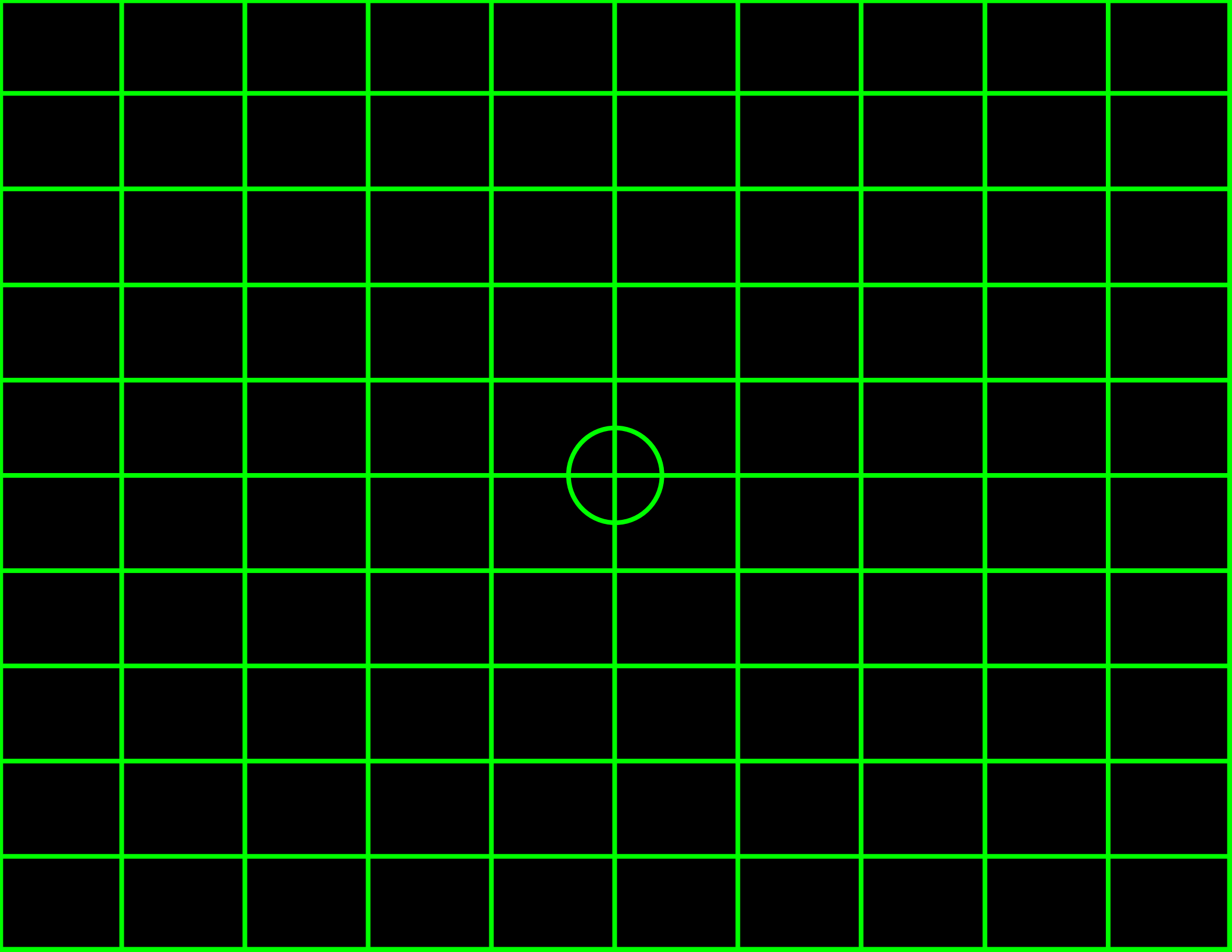


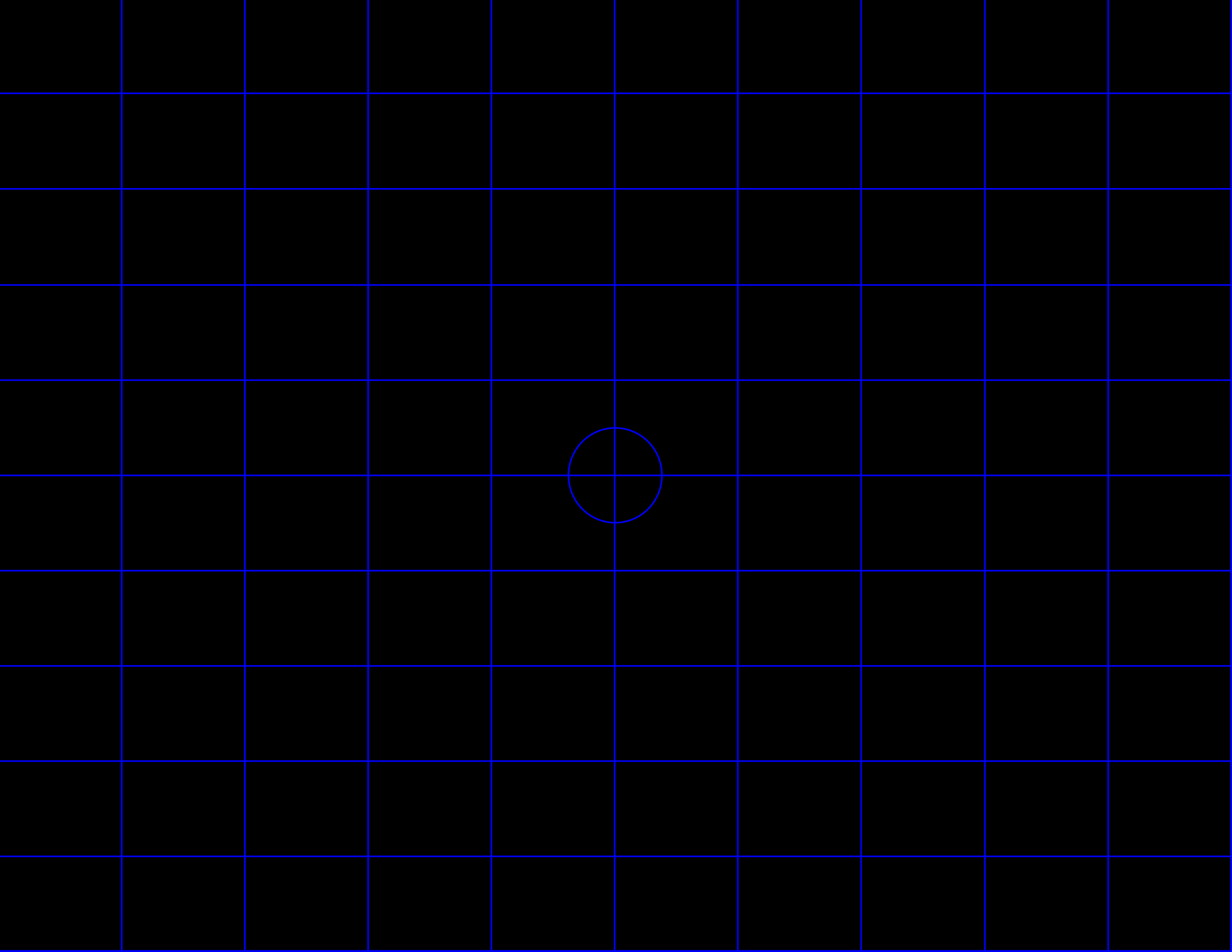


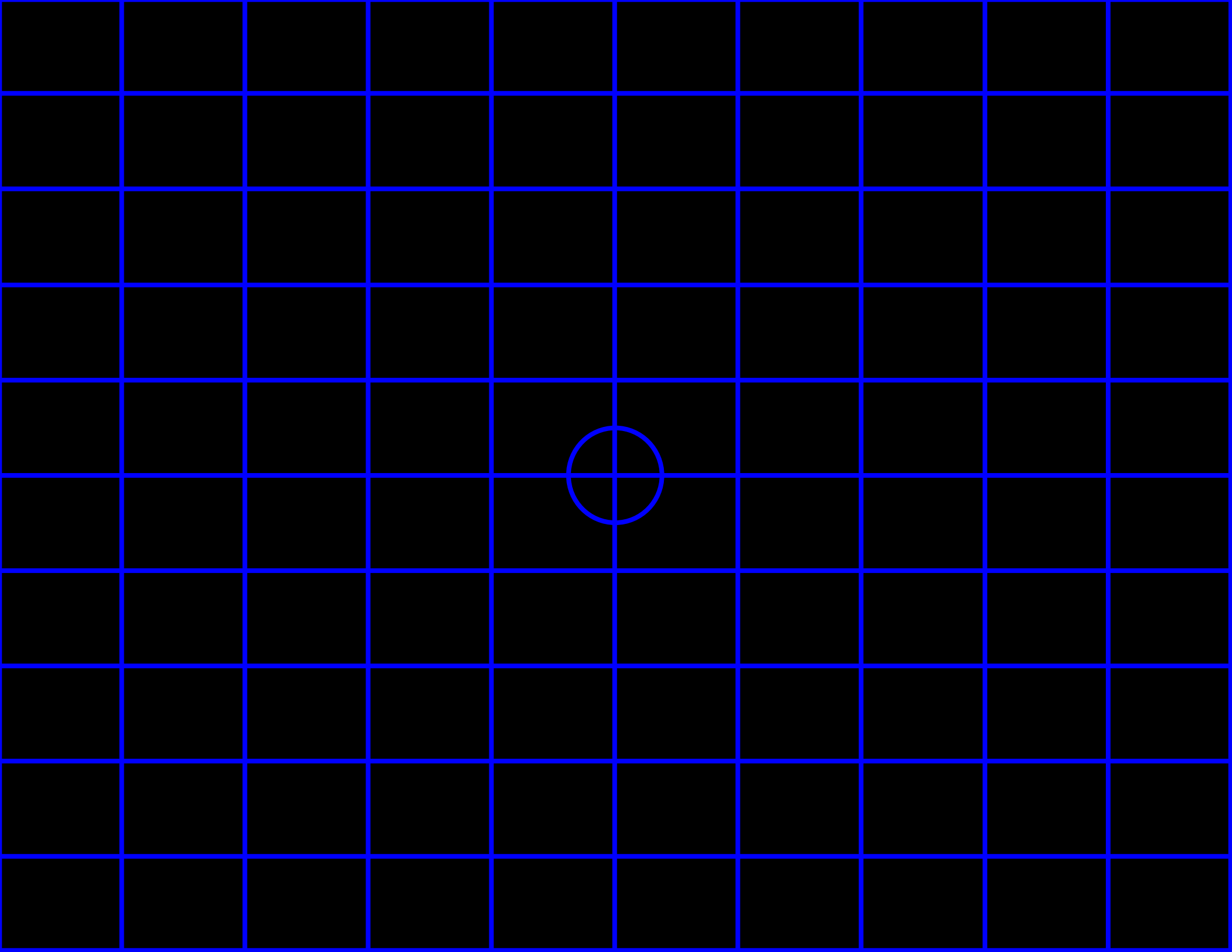


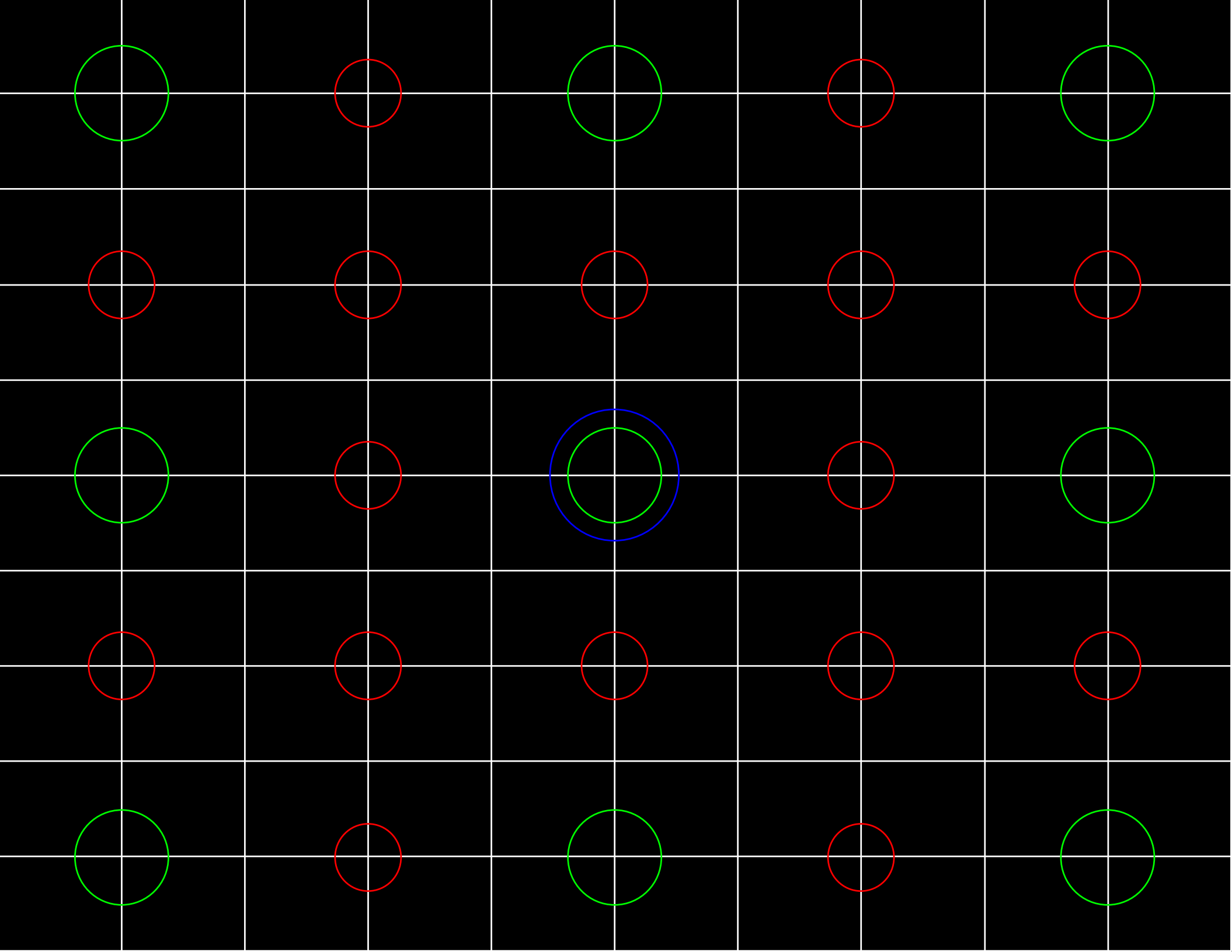


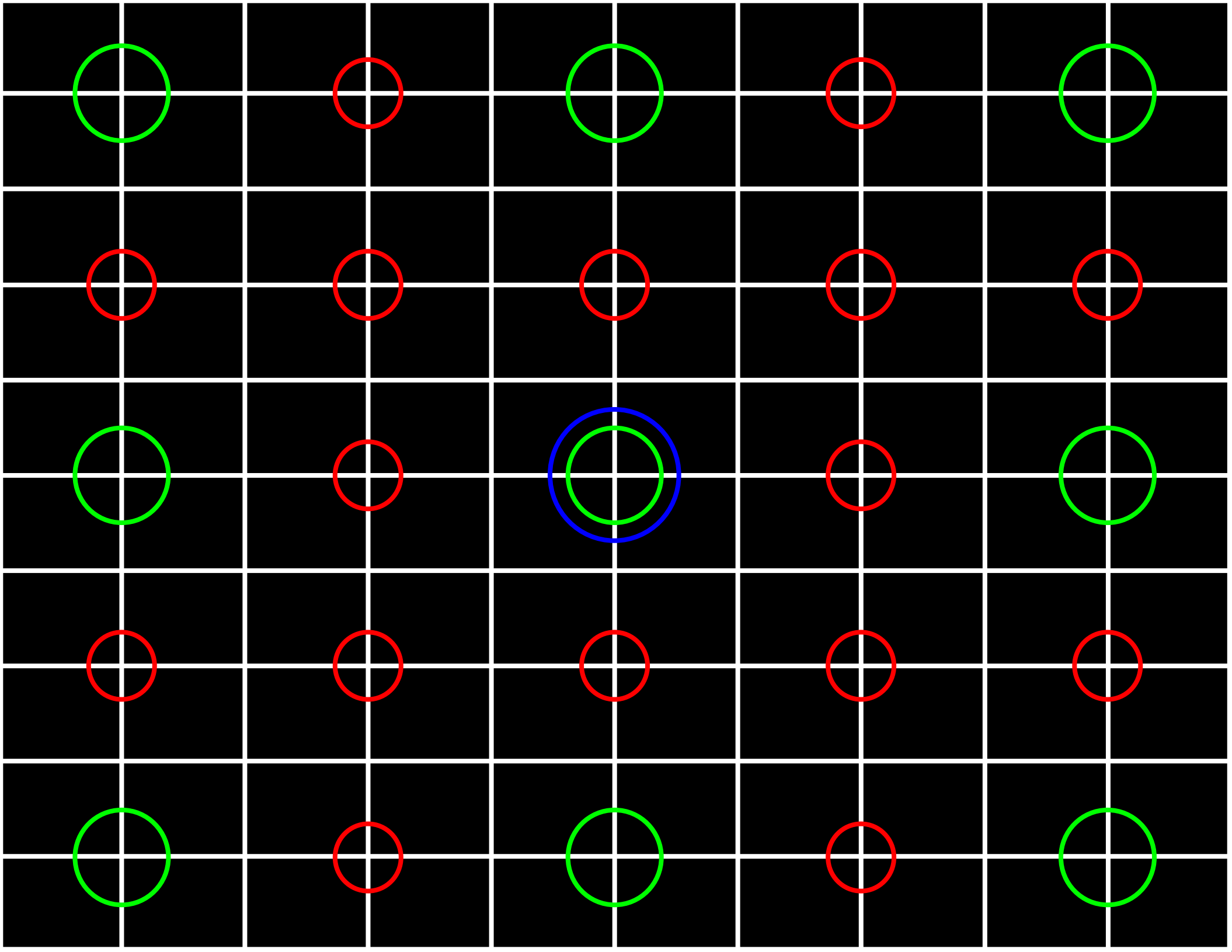


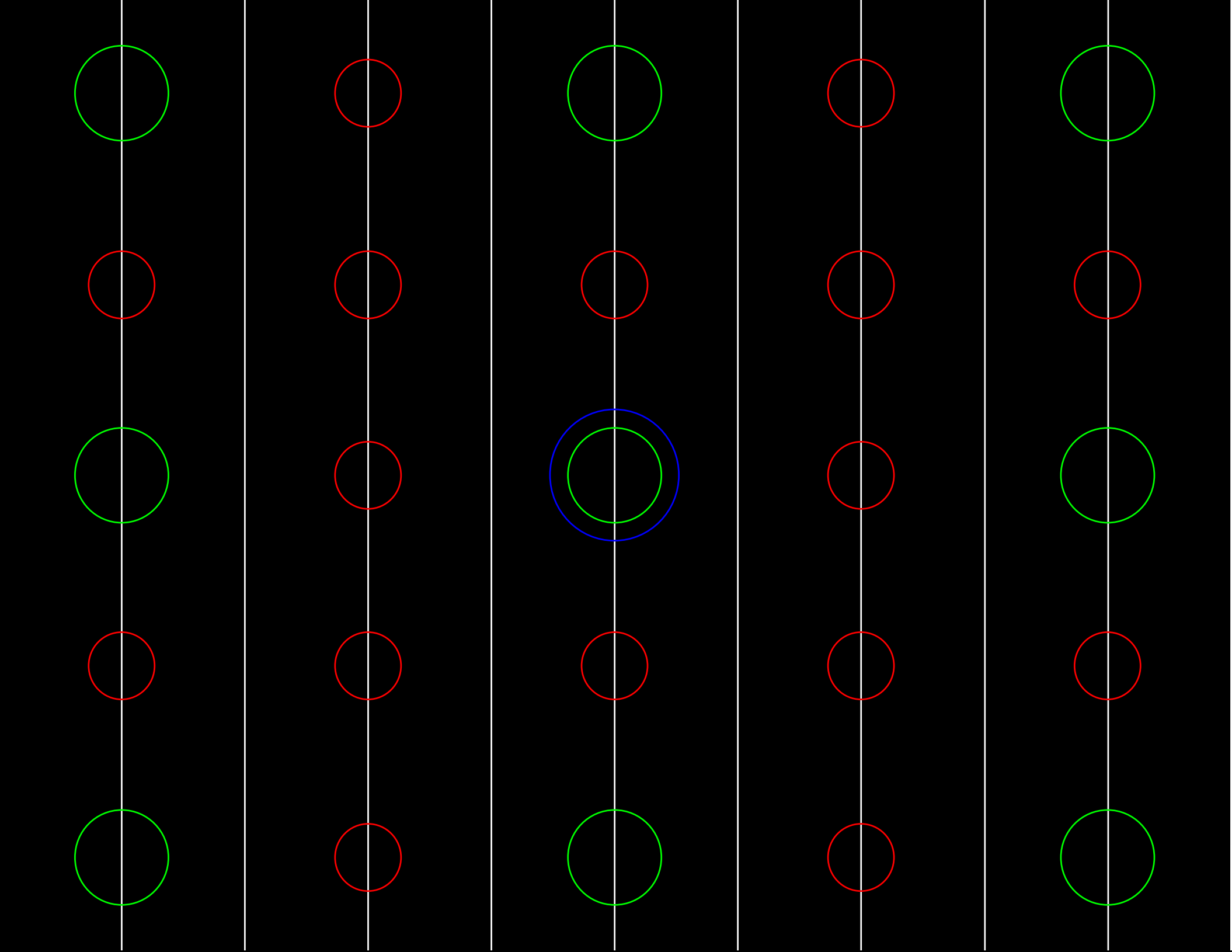


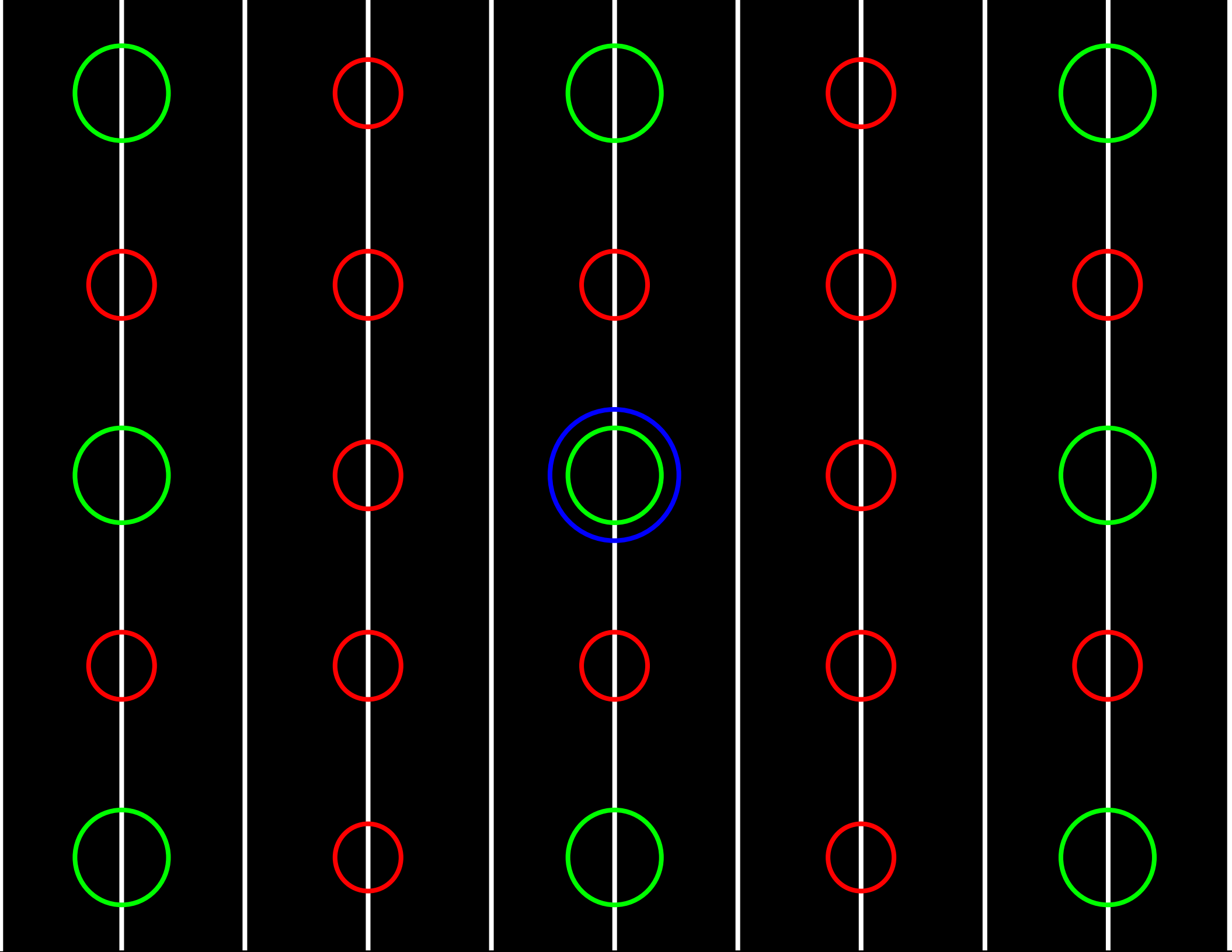


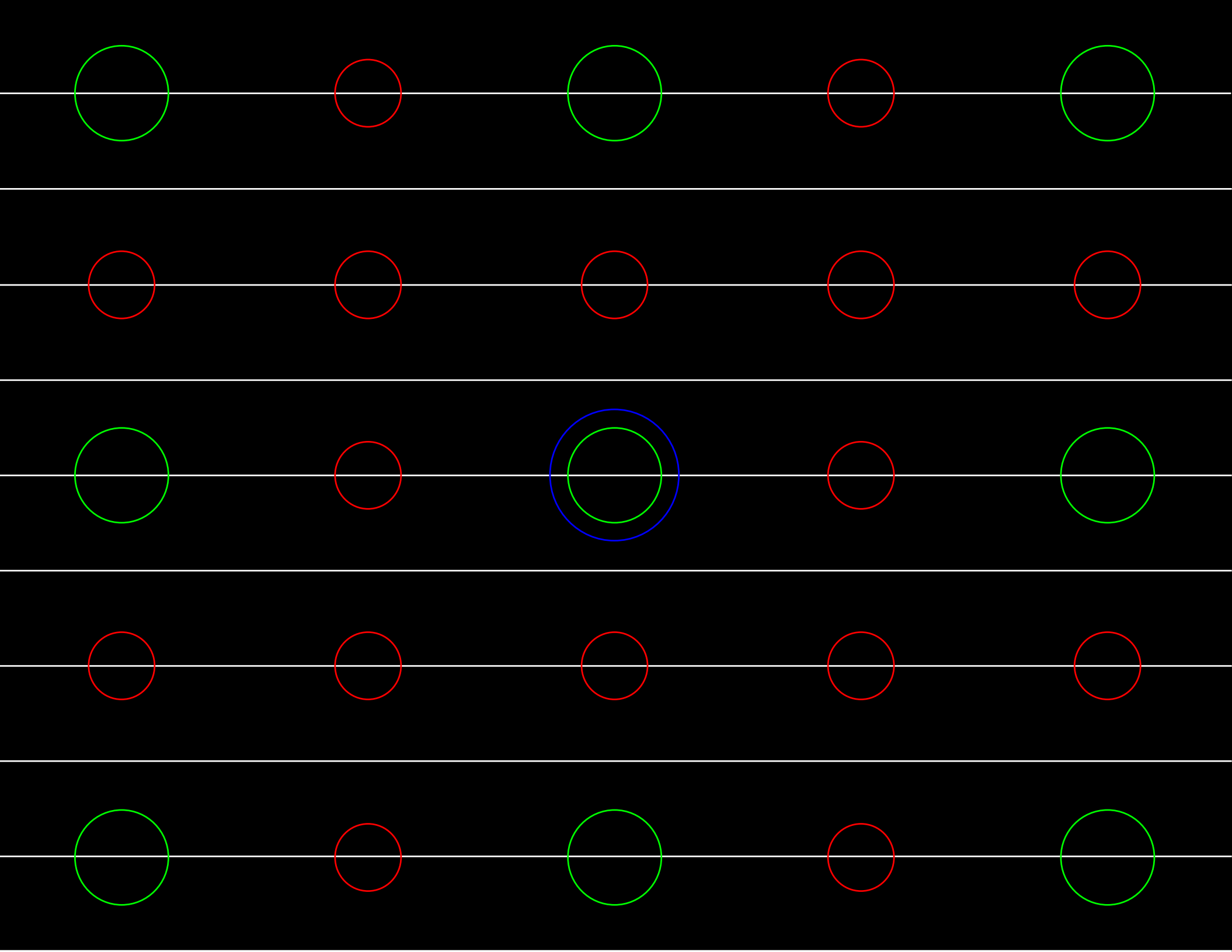


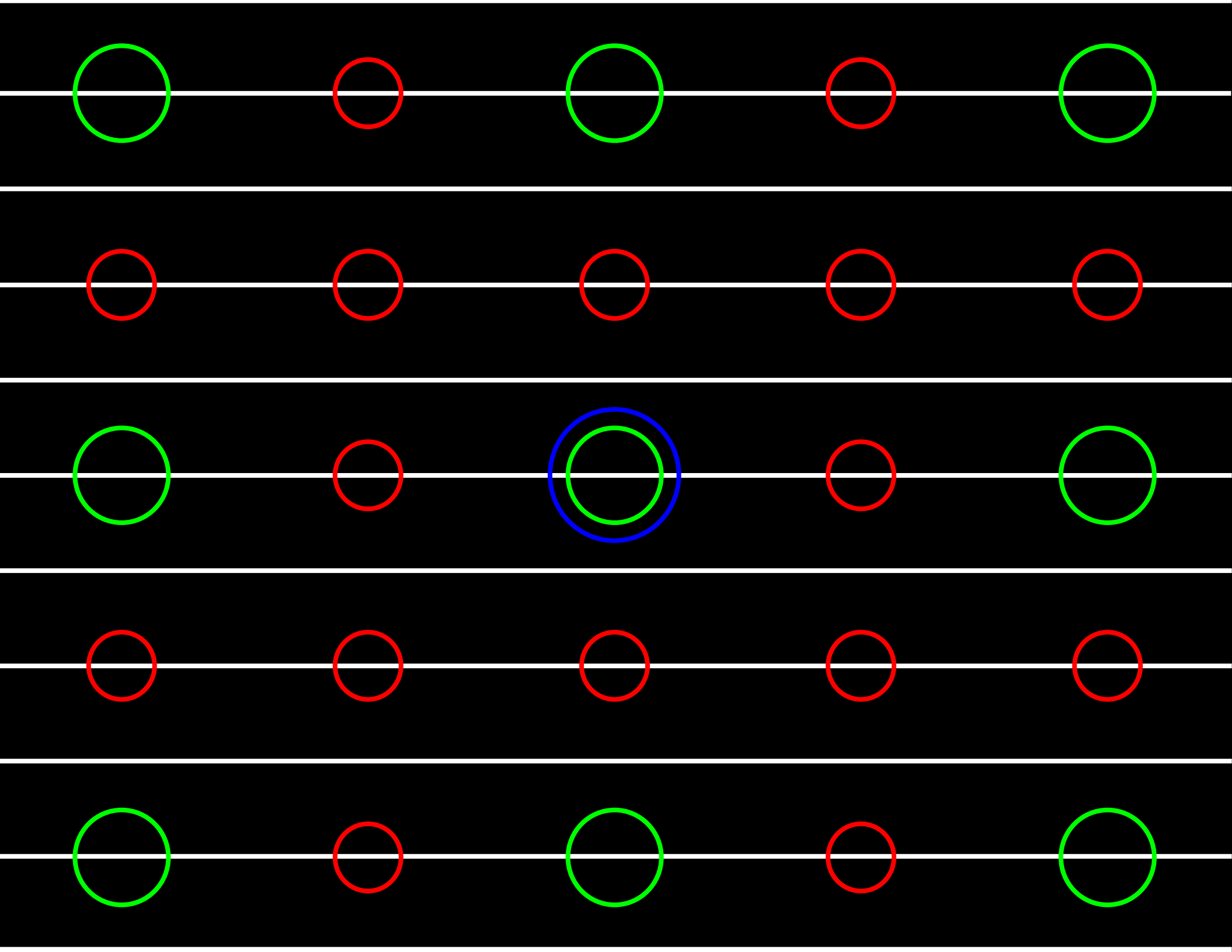


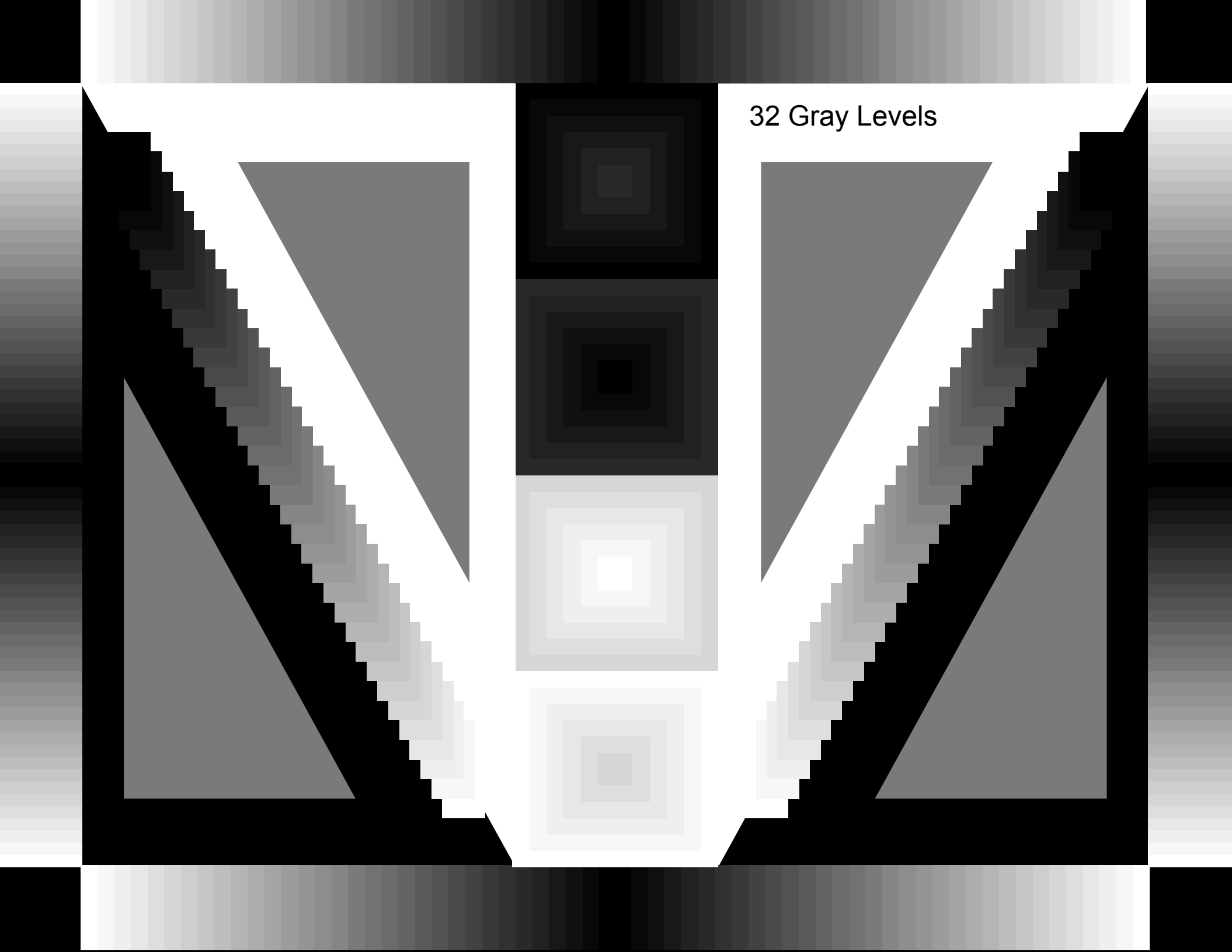


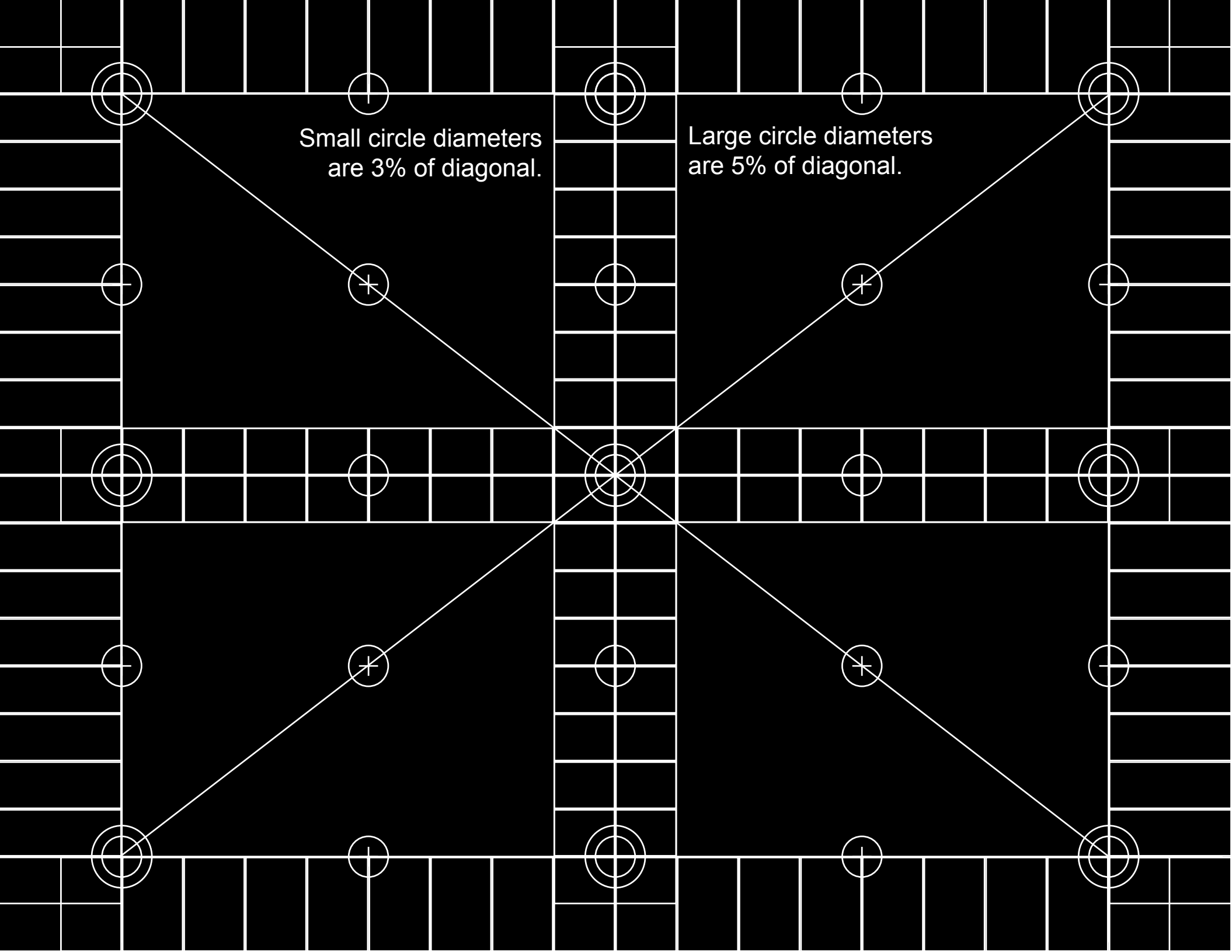









32 Gray Levels


Small circle diameters
are 3% of diagonal.
Large circle diameters
are 5% of diagonal.